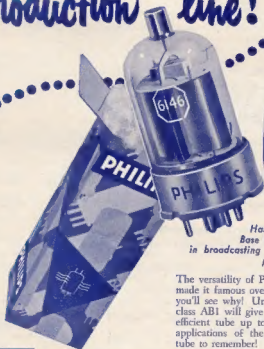


AUGUST
1955

THERE'S A PHILIPS VALVE FOR EVERY SOCKET

Amateur Radio

Hot off the
production line!



PHILIPS
TYPE

6146
ideal for

Hams • Mobile Communications
Base Stations • Low frequency stages
in broadcasting transmitters • Medium to high
power PA systems

The versatility of Philips type 6146 tube has already made it famous overseas. Check its performance and you'll see why! Under I.C.A.S. conditions a pair in class AB1 will give 120 watts of audio — and it's an efficient tube up to 175 MCs. The wide range of applications of the Philips type 6146 makes it a tube to remember!

Write for information and data sheets

PHILIPS ELECTRICAL INDUSTRIES PTY. LTD.

69 Clarence Street, Sydney, N.S.W. :: 590 Bourke Street, Melbourne, Victoria

148 Edward Street, Brisbane, Queensland :: 381-5 Murray Street, Perth, W.A.

119 Grenfell Street, Adelaide, S.A.

PVL-55.



1/-



THE BEST BY TEST FOR HIGH GAIN
AND HIGH LEVEL AMPLIFICATION

"HAM" RADIO SUPPLIERS

(KEN MILLBOURN, PROP.)

ANNOUNCE THEIR STOCKTAKING SALE BARGAINS GALORE. COMPARE THESE PRICES

PROMPT ATTENTION TO YOUR NEEDS.

NEVER CLOSED BETWEEN 9 A.M. AND 5.30 P.M.

Command Transmitters; Freq.: 4-5.3 Mc., 5.3-7 Mc., or 7-9 Mc.
Complete with valves and crystal £7/10/-

AT5 Transmitters, covers low freq. bands, also bandswitched
3 bands 2-20 Mc. using 6V6 M.O./xtal osc., 807 buffer/dbler.,
pair 807s in parallel; 6V6 grid mod. All stages metered with
0-5 Ma. meter (250 Ma. F.S.D.); complete with all valves,
a gift at £4/17/6

AT5-AR8 Junction Box and Cables £2/10/-

AR8 Cables 7/6 each

AT5-AR8 Aerial Coupling Units, contain one 0-5 Ma. meter
ext. thermo couple, single gang variable condenser, keying
relay, aerial change-over d.p.d.t 12v. 48 ohm relay, etc. Ideal
for wrecking. A Bargain at £1/10/-

THIS MONTH'S SPECIAL

AT5 TRANSMITTERS: Covers low freq. bands,
also bandswitched, 3 bands 2-20 Mc. All stages
metered with 0-5 Ma. meter (250 Ma. f.s.d.);
less valves. A gift at £3

Aust. Wavemeter Type AWB1, high freq. 145 to 165 Mc. approx.
Valve line-up: 958 diode connected into two type 1N5 valves
cascode connected d.c. amp. Complete with spare set of valves
and 3 inch 0-1 Ma. meter. Circuit enclosed. Contained in flat
grey metal carrying case. Packed ready for rail, £5/17/6

U.S.A. L.F.F. Units, comp. with valves, less genemotor, £4/17/6

English L.F.F. Units, complete with valves and 18v. input 450v.
output genemotor. New, only £5/17/6

Meters—0-100 microamp. heavily damped, brand new, 2½ in.
round. Calibrated 0-1500 linear scale £2/10/-

Meters—0-20v., 5 Ma. movement, square type, 2 inch, new, 15/-

Meters—0-2.5 Amp. R.F., square type, 2 inch, new 15/-

Meters—0-5 Ma., 1½ Ma. movement, round 2" type, new, 22/6

Phone Plug and Cable (4 ft.) American 4/6

Phone Plug and Cable (6 ft.) Australian 3/6

Output Transformers, well known make, 6,000 ohms c.t. to
600 ohms, 40 Ma. Max. level 30 db., new, to clear 35/-

Command Receivers, 6-9 Mc. range, less genemotor; air
tested £7/10/-

Command Receivers, 150-550 Kc., air tested £9/10/-

Command Receiver Racks, twin, brand new in cartons, includes
two relays, switches, phone sockets, etc. £1

Command Receiver Right-angle Drives 2/6

Command Receiver Flexible Drives, 12 ft. long 11/-

AR8 Receivers, 11 valves, 6 bands, continuous coverage 150
Kc.-25 Mc., BFO, audio controls, calibrated dials £15

AR301 High Freq. Receiver, uses three 954s, one 955, six 6AC7
I.F. stages at 30 Mc. Converts to 144 Mc. Complete, £6/10/-

Canadian type AR301 V.h.f. Receiver, uses 3-954, 1-955, six
6AC7 I.F. stages at 30 Mc. Easily converted to 144 Mc.
New, in case £8/10/- F.O.R.

BC733D Crystal Locked Receiver. Tuning range 108-120 Mc.
I.F. 6.9 Mc. Valve line-up: three 717As, two 12SG7s, one
12SH7, two 12SR7s, one 12SQ7, one 12A6. Also contains six
miniature relays, less xtal. Packed ready for rail. £5 each.

American Low Freq. and Broadcast Band Receiver, RAX, 7
valves, 4 bands: 200-300 Kc., 300-500 Kc., 500-900 Kc., 900-
1500 Kc. I.F. 160 Kc. Calibrated vernier dial, etc. Ideal
Q5'er. Complete with 28v. genemotor £17/10/-

American ARB Com. Receivers. Freq. coverage in four bands:
150 Kc. to 9.5 Mc. continuous. Complete with 24v. genemotor
and control box £17/10/-

STOCK MUST BE REDUCED! MORE BARGAINS ON PAGE 16

Six volt bayonet type Dial Lamps 1/- each

American Headphones, low imped., complete with cable, 25/-

Test Sets ASB. Contains 200 microamp. meter. Valve line-up:
four EF50s, one VR150, one 6B8, two 6X5, one 6H6, one 5Y3.
240v. AC input, 250 HT at 80 Ma., V.R. VR150 supply. Brand
new in carton £7/10/- F.O.R.

American Loran Indicators. Contains 26 valves including 14-
6SN7, 2-6SL7G, 9-6H6, 1-6SJ7 and 5CP1 C.R.O. tube. Com-
plete with 100 Kc. R.C.A. Xtal and Valves £15

5FP7 5 inch electromagnetic deflection with socket housing,
deflecting coils and controls £3

5A MELVILLE STREET, HAWTHORN, VICTORIA

North Balwyn Tram Passes Corner, near Vogue Theatre.

Phone: WA 6465

Money Orders and Postal Notes payable North Hawthorn P.O. Packing Charge on all goods over 10 lbs. in weight, 5/- extra.

AMATEUR RADIO

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

EDITOR:

T. D. HOGAN, VK3HX.

MANAGING EDITOR:

J. G. MARSLAND, VK3NY.

TECHNICAL EDITOR:

K. E. PINCOTT, VK3AFJ.

TECHNICAL STAFF:

J. C. DUNCAN, VK3VZ.

D. A. NORMAN, VK3UC.

COMPILATION:

R. W. HIGGINBOTHAM, VK3RN.

CIRCULATION:

I. K. SEWELL, VK3IK.

ADVERTISING REPRESENTATIVE:

BEATRICE TOUZEAU,
96 Collins St., Melbourne, C.I.
Telephone: MF 4505

PRINTERS:

"RICHMOND CHRONICLE,"
Shakespeare St., Richmond, E.I.
Telephone: JB 2419.

MSS. and Magazine Correspondence should be forwarded to the Editor, "Amateur Radio," C.O.R. House, 191 Queen Street, Melbourne, C.I., on or before the 8th of each month.

Subscription rate in Australia is 12/- per annum, in advance (post paid) and A15/- in all other countries.

Wireless Institute of Australia (Victorian Division) Rooms' Phone Number is FJ 6997.

WI BROADCASTS

All Amateurs are urged to keep these frequencies clear during, and for a period of 15 minutes after, the official Broadcasts.

VK3WI: Sundays, 1100 hours EST, 7160 Kc. and 2000 hours EST 50 and 144 Mc. No frequency checks available from VK3WI. Intrastrat working frequency, 7125 Kc.

VK3WI: Sundays, 1130 hours EST, simultaneously on 3875 and 7140 Kc., 21.015 and 146.35 Mc. Intrastrat working frequency 7125 Kc. Individual frequency checks of Amateur Stations given when VK3WI is on the air.

VK3WI: Sundays, 0900 hours EST, simultaneously on 3500 and 14343 Kc. 3500 Kc. channel is used from 0915 hours to 1015 hours each Sunday for the W.I.A. Country back-up. No frequency checks available.

VK3WI: Sundays, 1000 hours EAST, on 7146 Kc. Frequency checks are given by VK3MD and VK3WI by arrangements on all bands to 50 Mc.

VK3WI: Sundays, 0530 hours WAST, on 7146 Kc. No frequency checks available.

VK3WI: Sundays, at 1000 hours EST, on 7146 Kc. and 146.35 Mc. No frequency checks are available.

Published by the Wireless Institute of Australia,
C.O.R. House, 191 Queen Street,
Melbourne, C.I.

EDITORIAL



CLOSING OUR RANKS

In response to Federal Executive's invitation to Divisions to provide "Guest Editorials," VK4 has entrusted the first contribution to the pen of one of its old timers, VK4HMM.

Since its inception, Amateur Radio has experienced its difficulties and its triumphs. The difficulties have been overcome by the Amateur's tenacity of purpose and the unity and strength of the organisation representing his interests. The triumphs have not always received the recognition they deserved.

The assaults of non-co-operative nations, commercial interests and dissenters within the Amateur ranks have failed to wreck our organisation, due in the main to the energetic and tactful leadership of our Federal and Divisional Councillors, supported by loyal members of the rank and file.

Important and vital issues are at stake, particularly the fight for the retention of our existing frequency bands against the encroachment of commercial interests—now is the time to close our ranks. All Amateurs must present one solid front to meet the challenge of our adversary. We must prepare now to give full and ample support to our delegates at the next International conference.

Dr. Raymond Bowers, of the University of Rochester, U.S.A., has had this to say about Amateur Radio: "It is the means of communication with others on equal terms; of finding friendship, adventure, and prestige while seated at one's own fireside. In

picking his human contacts out of the air, the Amateur is not seen by them; he is not known by the clothes he wears, but by the signals he emits. He enters a new world whose qualifications for success are within his reach. There are no century old prejudices to impede his progress. He enters a thoroughly democratic world where he rises or falls by his own efforts. When he is a beginner, the radio elders help him; and when he becomes proficient, he will willingly help the younger generation. At the close of the day, filled with the monotonous routine of the machine age, he can find adventure, vicarious travel, prestige and friendship by throwing in the switch and pounding his signals on the air."

Reading such a statement should make us proud of the fact that we are members of the great fraternity of Radio Amateurs.

After refreshing your memory by re-reading the "Amateur's Code," you will surely agree that these ideals are worthy of preservation. Resolve to do your part to preserve the ideals so nobly inspired by the splendid pioneers of Amateur Radio.

Let's close the ranks and give of our best to achieve the progress and prosperity of our organisation—the Wireless Institute of Australia—by regularly attending meetings, supporting the Council and assisting all Amateurs, spreading the gospel of the "Amateur's Code" wherever possible.

FEDERAL EXECUTIVE

THE CONTENTS

| | | | |
|--|----|--|----|
| 120 Watts of Audio Without Driving Power | 2 | Fifty Megacycles and Above | 19 |
| Let's Build a Tower | 5 | Book Review—New Zealand Amateur Call Book | 19 |
| A Practical Vacuum Tube Voltmeter | 7 | Amateur Call Signs | 20 |
| An Introduction to Two Metres | 10 | Ross Hull V.h.f. Contest Results Amendment | 20 |
| 6146 Beam Power Amplifier Data | 12 | DX Activity by VK3AHH | 21 |
| Victorian All Models Exhibition | 14 | Prediction Chart for August, 1955 | 21 |
| Remembrance Day Contest, Variation of Awards | 14 | Federal, QSL, and Divisional Notes | 23 |
| Amateur Radioteletype | 17 | Correspondence | 23 |

120 Watts of Audio Without Driving Power*

CLASS AB1 MODULATOR WITH 6146s

BY GEORGE GRAMMER, WIDF

THE rather interesting capabilities of the 6146 as a Class AB1 audio amplifier do not seem to have attracted much attention in Amateur circles, although it is a fact that a pair of tubes is capable of delivering practically the same audio power in AB1 as in AB2. Either way, it is possible to get enough power to modulate a Class C input of a quarter kilowatt. When a choice is available, it is hardly likely that anyone would select AB2, with its driver regulation problems, in preference to AB1—especially when no-driving-power operation usually means that one less speech amplifier stage will be needed for the same over-all gain.

The modulator uses a pair of the tubes in AB1 and, with the exception of the preamplifier unit (which could easily have been included on the same chassis if it had been desired) is complete with power and bias supplies on a 7 x 17 x 3 inch chassis. The preamplifier was deliberately made into a separate unit in the thought that, while it is highly desirable to have the microphone input and gain control within easy reach at the operating position, there is no reason at all why the rest of the audio equipment should be in the same vicinity. The modulator and power supply have no controls that need be manipulated, nor do any of the tubes or components require watching during transmitting periods. This section can simply be tucked away in some spot where it will not take up room that might be used more profitably for other purposes.

The modulator power supply unit includes one stage of speech amplification, and also is equipped with a splatter filter and an audio take-off for 'scope monitoring. It is easy to build in the latter two at the start, but somewhat messy to add them externally after it becomes appreciated that they should be classed as necessities rather than accessories.

TUBE CAPABILITIES

The audio power that can be obtained from a pair of tubes is, of course, a function of the plate voltage used on them. The following table is illustrative:

| Plate Voltage | Power Output | Load Resistance |
|---------------|--------------|-----------------|
| 500 volts | 84 watts | 4,200 ohms |
| 600 volts | 104 watts | 5,200 ohms |
| 750 volts | 134 watts | 6,700 ohms |

The power output figures are calculated from data taken from the published tube curves, using a screen voltage of 200, and the actual outputs will be somewhat lower because of losses in the output transformer. These "theoretical" output figures cannot be compared directly with those given by the tube manufacturers in tables of typical operating conditions, partly be-

• Unlike most tubes, the 6146 will develop almost as much power output without driving power as with it. This article describes a complete modulator unit that takes advantage of this characteristic. Various power levels can be obtained, depending on the choice of power supply components.

The modulator includes a splatter filter, made from inexpensive components, that can be applied to practically any phone transmitter where the Class C plate current does not exceed about 300 Ma.

The first two stages of speech amplification are built into a small box that may be used at the operating position while the main chassis is installed in any convenient location.

cause of somewhat different choice of load resistance and partly because the manufacturers' figures usually are based on the fundamental-frequency component of power output, with distortion components given separately as a percentage.

The figures in the table above are more properly described as the average power in a sine wave having the same instantaneous power at the peak of an a.f. cycle as the waveshape actually considered—or, for short, "equivalent sine-wave power output." Since it is the peak power that counts in determining the modulation percentage, and all our discussions of modulator power use this same "equivalent sine-wave power" as a basis, we believe this kind of figure to be more useful in modulation calculations with voice waveforms.

Suitable sets of components for all three of the voltages listed above are readily available, so the power level can be selected to suit the Class C amplifier to be modulated. For purposes of estimating, measurements have shown that the actual power outputs to be expected are approximately 75, 95, and 120 watts for the 500, 600 and 750 volt conditions, respectively.

THE PREAMPLIFIER

The preamplifier circuit, shown in Fig. 1, is built in a 2 x 4 x 4 inch aluminum box. It uses a 2AX7 for two resistance-coupled triode stages. The circuit is quite straightforward, except for the fact that a 0.003 uF. condenser is used for coupling between the first and second stages. The object of this is to help taper the low frequency response for more effective speech work. Comparatively, the time constant of the input grid circuit seems quite large, but the effective resistance from grid to

cathode is much lower than the 2.2 megohm resistor would indicate because of the flow of "virtual velocity" electrons in this circuit. This current flow provides the operating bias of about 1 volt. (It should not be confused with the grid current that results from rectification of an applied signal; there is no rectification of the latter type in this case.)

The 12AX7 is mounted on a small bracket fastened to one removable side of the box. With the exception of the microphone connector and gain control, which are on one edge of the box, and the connector, J2, on the opposite edge, all components are on this same plate, mounted between appropriate tube socket pins and tie point strips. Enough lead length is allowed from the components on the box itself to permit taking off the plate to get at the wiring. Rubber feet are mounted on the other removable side of the box, which becomes the bottom when unit is in use.

The preamplifier is connected to the modulator through a 10-foot length of cable, having one shielded and two unshielded conductors. The shielded wire, connected to Pin 3 of J2 in Fig. 1, is used for the audio output. The shield is the common ground connection through the cable. One of the other two wires is used for plate current and the last for filament current. The shielded wire in this length of cable has a capacitance of about 500 pF., and since this capacitance shunts the output circuit there is considerable reduction

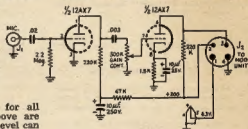


Fig. 1.—Preamplifier circuit. Fixed resistors are ½ watt. Capacitances in uF. J1—Microphone connector. J2—Four-prong connector, chassis mount, male.

of high frequency response in the cable—about 4 db. per octave above 1,000 cycles. This is compensated for in the modulator unit.

MODULATOR AND POWER SUPPLY

The circuit diagram of the modulator and power supply section is given in Fig. 2. The "high-boost" circuit, consisting of the two resistors and 270 pF. condenser associated with the grid of the 6C4 speech amplifier, compensates for the drop in highs in the cable coming from the preamplifier. Since low frequency attenuation is desirable, an inexpensive interstage audio transform-

* Reprinted from "QST," December, 1954.

although there is nothing to prevent its being used that way to the degree permitted by the signal-handling capability of the circuits up to the grid of the 6C4. However, clipping is bound to occur in any modulation system unless special means, such as automatic gain control, are included for preventing it. Lacking such means, steps should be taken to prevent clipping from causing splatter. A splatter filter, plus the adjustment precautions outlined above, will do a good job of keeping the transmitted signal clean.

FILTER DESIGN

The filter used in this modulator is a simple one of the constant-k type. The inductance and capacitance required will depend on the Class C load resistance and therefore cannot be given in a single specification. The chart of Fig. 3 gives the design values for various loads from 1,000 to 10,000 ohms, for three cut-off frequencies, 2,500, 3,000 and 3,500 cycles. While a cut-off frequency of 3,000 cycles is probably optimum, the additional curves are given for the purpose of estimating the effect of having to use available values of components, particularly fixed condensers. For example, if the Class C load resistance (plate voltage divided by plate current in amperes) is 4,000 ohms, the chart shows that approximately 0.012 μ F. should be used at C1 and C2. The nearest standard value in a single unit is 0.01 μ F. and the chart shows that this is the proper value for a cut-off frequency of 3,500 cycles. The inductance could be chosen accordingly (0.5 henry, from the chart) or, as an alternative, 0.01 and 0.002 units could be connected in parallel. Neither approach is quite as clean-cut as it sounds, because of the fairly large capacitance tolerances that are usually associated with paper condensers. The ideal method would be to measure the capacitances and pad them out to the correct values, and if the facilities are available to do this it is a recommended procedure. However, even quite wide departures from the theoretically correct values do not greatly affect the performance from a practical standpoint—that is, in the way the transmitter sounds or in the suppression of splatter. A reasonable procedure, therefore, is to pick out a standard value of capacitance that lies somewhere on the load resistance line between the 2,500 and 3,500 cycle curves.

It will seldom be possible to find an iron-cored choke having exactly the required inductance. However, it is easy to modify a "television" power supply filter choke for the purpose. These usually have ratings from 1 to 2 henrys at 200 or 300 Ma. Measurements on a "1 henry 300 Ma." choke of this type showed its inductance to be about 1.9 henry, without d.c. and with small applied a.c. voltage. Removing the entire stack of I laminations reduced the inductance to 0.53 henry. Calculations based on the total resistance and the wire size (No. 28) showed that the choke had about 22 layers, so 7 of these were unwound and the inductance was then measured with various air gaps, using paper and cardboard spacers. The measured values are shown in Table I.

In the course of making measurements it was found that the presence of the "finishing" laminations that overlap

TABLE I

Measured inductance values for various air gap spacings, "1 henry, 300 Ma." filter choke with seven layers (approx. 30 per cent. of turns) removed.

| Air Gap inch | Inductance henry |
|-----------------|---------------------|
| 0.003 | 0.71 |
| 0.010 | 0.62 |
| 0.020 | 0.48 |
| 0.025 | 0.46 |
| 0.050 | 0.36 |
| 0.075 | 0.31 |
| 0.100 | 0.28 |
| 0.125 | 0.26 |
| 0.150 | 0.24 |

the I sections on each side of the core had a very marked effect on the inductance and Q. These end pieces cause a pronounced increase in inductance for a given air gap, as compared with the inductance when the end pieces are not assembled with the regular core pieces. They also reduce the Q of the coil to less than half the value obtained when they are not used, presumably because of flux concentration in the small cross section of the overlapping part. They were therefore not used in making the measurements in Table I, nor in reassembling the choke, the whole works being held together by clamps made from tempered Presdwood. The Presdwood mounting also serves to insulate the core from the chassis, which should increase the coil-to-chassis break-down voltage.

Table I shows that for air gaps above 0.020 inch, the inductance changes fairly slowly with the thickness of the gap, so in this range—roughly 0.25 to 0.5 henry—this particular type of choke as modified can easily be adjusted to any value required for Class C loads ranging

from 2,000 to over 5,000 ohms. This covers most of the practical cases. Measurement of the inductance is desirable but not necessary if the thickness of the spacer used in the air gap can be measured with moderate accuracy.

The inductance of a choke varies with the a.c. voltage applied to it as well as the direct current flowing through it. Because of the rather large air gap that is used in this application, the d.c. component is of practically no consequence. Checks showed, however, that the inductance increased about 15 per cent. at a.c. levels representative of full audio output from the modulator as compared with bridge measurements made with a low voltage source. An allowance of this order can be made in determining the proper air gap. The figures in Table I are based on bridge measurements of inductance.

PERFORMANCE DATA

The over-all frequency response of the system including the splatter filter is such as to tend to emphasize those frequency components that contribute most to effective speech transmission, without sacrificing that nebulous thing called "satisfactory quality." Judged by listening tests, the balance between highs and lows is quite satisfactory; also, there is no difficulty in identifying sibilant sounds such as "s" and "t" which often become indistinguishable when the highs are cut too much. The response curve is essentially flat (within ± 2 db.) between 350 and 2,800 cycles with the components and values given in the diagrams, and using a splatter filter designed for working into a 5,000 ohm load (measured values, 0.47 henry and 0.01 μ F.). Compared with the level at a 1,000 cycle reference, the response is down 6 db. at 200 cycles and 12 db. at 100 cycles. At 3,000 cycles the response is down 4 db. below the same reference, and drops at a uniform rate of 20 db. per octave above 3,000 cycles.

Practically all of the attenuation at the high frequency end is in the splatter filter. The modulator and speech amplifier are intentionally cut only at the low end and the response stays fairly uniform out to 5,000 or 6,000 cycles. On the premise that the frequency components that cause splatter will practically always be generated in the modulator or Class C amplifier, as discussed earlier, the ones generated in the modulator obviously have to be suppressed between the modulator and Class C amplifier. Reduction of high frequency response elsewhere in the audio system accomplishes little or no splatter reduction—since the legitimate high frequency components in the ordinary voice are of low amplitude—and simply causes a loss of intelligibility and naturalness. In other words, there is no point in cutting the high end unless it is done in a splatter filter, located in the right spot to catch not only the legitimate components outside the needed band, but also the spurious components.

The measured power outputs at various voltages were mentioned earlier. The power supply filtering, plus low frequency cutting, result in a hum level that is largely masked by the first stage noise, without voice input and gain at maximum. At maximum output with a pure tone signal the hum increases be-

(Continued on Page 14)

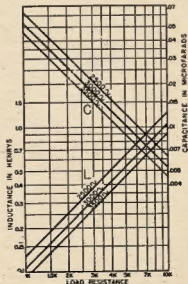


Fig. 3.—Splatter Filter Design Chart. Values should be taken from L and C curves marked with the same cut-off frequency.

LET'S BUILD A TOWER

BY JOHN HARLOCK,* VK6GU

The writer, like a lot of other Amateurs, has always looked with admiration and envy at a well constructed rotatable multi-element array. Particularly when the beam is mounted on a solidly built tower.

Like other Amateurs he, too, has heard stories about a VK6 who was given 10/- to remove a windmill tower, "Carriage Paid," but personally has found such bargains more elusive than rare DX.

After moving to his present QTH, he, by virtue of lack of space, was compelled to erect some type of beam. Obviously a beam must go somewhere up in the air. The problem was how to keep it there. The first solution was a 30 ft. length of water pipe. This was found to be quite satisfactory till winter gales caused one side of the quarter wave matching section to break away from one side of the driven element.

Now the problem of repairing this damage presented itself. Obviously if a sky hook had been available, this would have been used for keeping the beam in the air. So the problem meant lowering the whole structure or climbing up and effecting repairs.

The average Amateur must perforce be a man of many parts, but as sleep-jacking does not enter into the writer's make-up, the whole assembly was laboriously lowered, repairs effected and the gang once more asked to assist in hanging the sky wire.

Isn't it amazing the number of excuses even our best friends can think up at a time like this?

Again the problem of keeping the beam some distance from the ground had to be faced. Also, that best of teachers—experience—whispered loudly "this time you must be able to climb up to the works. No more lowering and raising!" What then? A tower!

As has been pointed out, a windmill tower in good condition was practically impossible to obtain. Well, why not

build one? But from what material? Angle iron? A little hard to work, but worth a try.

Investigation into cost and availability ruled this out.

One thing left—timber. Once more the hubbub of finance reared its ugly head and put imported, easy-to-work soft wood in the untouchable class along with angle iron.

In VK6 there are two alternatives remaining, both local eucalypt hardwoods, jarrah (*eucalyptus marginata*) and karri (*E. diversicolor*). Of the two, karri is more readily available in long lengths, is less liable to warp, stronger and is much the same price as jarrah, but more liable to white ant attack if "earthed."

Karri was selected and the design arranged to keep it above ground.

A 42 ft. high, 4 ft. base and 6 inch top square pyramid structure was decided upon, the design of each side being as in Fig. 1. A careful scale drawing was made and quantities calculated so that the timber could be ordered with a view to minimum wastage. Each leg comprises three pieces each 14 feet long of 2" x 2" bolted together as in Fig. 2. The lattice bracing are of 2" x 1" lengths being ordered so that offsets from the lower braces could be used higher up, and also as the plates for joining the leg sections.

The timber was ordered and duly arrived, and after the now enthusiastic amateur carpenter had worn himself out carrying home large parcels of iron nails and bolts, some well meaning friend told him just what karri can do to unprotected iron. Galvanised bolts were advised, but were unobtainable.

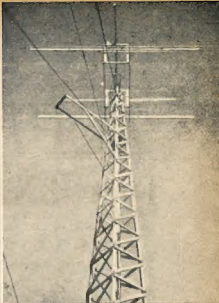
The services of a chemically-minded friend (at the time A.O.C.P. failed, now happily one of the gang) were availed of and the 32 iron bolts for the legs were hot-dip galvanised, amid splashing molten zinc, powdered charcoal and fumes of sal-ammoniac. The latter two to prevent the formation of oxide scum.

A humorous sidelight on this procedure occurred when the galvanising adviser, eagerly awaiting a much-needed cup of brew (to be prepared by the writer) caught the latter in the act of putting powdered sal-ammoniac into the teacups instead of sugar. The moral seems to be to drink a different type of brew, whose bitter taste needs no sugar to disguise it.

The alternative to nails turned out to be 24" galvanised round-headed screws, available cheaply at the time. 18 lbs. in all were bought. The holes were drilled and the seven hundred odd screws driven home. Oh! My aching back! A screwdriver bit in the brace simplified screwing, but all holes had to be hand drilled twice (shank and thread of screw) as an electric drill could not be begged, borrowed, or stolen.

Bolts were not considered because of the possible weakening effect, also hand galvanising of some 700 bolts could not be thought of.

Nails were used only to hold the lattice bracing in position before screwing.



CONSTRUCTION

The four legs were bolted together. One side was carefully laid out on the ground, the braces (21 horizontal and 21 diagonal) were temporarily nailed in position, then screwed (each with four screws). It must be stressed here that great care be taken with the "prototype" if satisfactory results are to be obtained.

Who was the VK6 who obtained plans from the writer and was heard to tell another VK6 that one side was 4" bigger than the other three?

The opposite side was assembled using the first side as a template, the two completed sides turned on edge and the bracing struts for the third side nailed and then screwed down. The whole assembly was then inverted (like other jobs it got heavier as it went along, possibly a little more so) and the tower finished. Cross braces were put at the 10, 20 and 30 foot levels to prevent twist in the tower. See Fig. 3.

FIG 3
PLAN AT
10', 20' & 30'
LEVELS

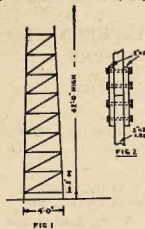


In the meantime, some 2" x 2" x 1/8" angle iron (four pieces each about 5 ft. long) cement, bluemetal and sand (yes, sand, in VK6 sand-is-groper land, it's a scarce commodity in Fremantle which is built on limestone) were obtained by diverse means for very little cost.

The station wagon of the aforesaid chemically-minded friend, the smallest station wagon in the VK6 Division, did admirable service in transporting these necessities.

The Fremantle limestone makes an excellent foundation for a structure of this type, but did not improve either the writer's back or his temper when he endeavoured to dig holes in it. The holes were 3 ft. 6 in. deep (18" being in stone) and 1 ft. 6 in. square. Finally angle iron was bolted to the bottoms of

(Continued on Page 14)



* 15 Lilly Street, South Fremantle, W.A.

INTRODUCING THE NEW

"ZEPHYRETTE"



Type 3XA Crystal Microphone

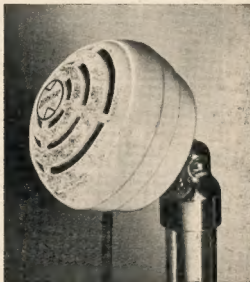
"THE MICROPHONE THAT SPEAKS FOR ITSELF"

Amazing
Value
46/9

Retail

★ ★

Ideal for Portable Use,
Home Recorders,
Tape Recorders, P.A.
Equipment, etc.



- Grid Impedance.
- Bakelite Cage.
- Hand or Table Model.
- Hum Shield fitted.
- Small, compact, lightweight.
- Insert fully protected & securely mounted.
- 60-6,500 c.p.s.
- High output —41 db (0 db = 1 volt/dyne/cm²).
- Chrome swivel available to provide full tilting head.
- First grade P.V.C. covered shielded cable.

AUSTRALIAN MADE, USING THE SPECIALLY IMPREGNATED
AND PROTECTED ZEPHYR CRYSTAL INSERT

AVAILABLE FROM ALL LEADING TRADE HOUSES

AUSTRALIAN MADE — FOR AUSTRALIAN CONDITIONS

Manufactured by—

ZEPHYR PRODUCTS PTY. LTD.

58 HIGH STREET,
GLEN IRIS, VIC.

(Box 2, Armadale P.O., Vic.)

Phone: BL 1300

A Practical Vacuum Tube Voltmeter

BY JOHN MILLER,* VK2ANF

SOME years ago there appeared in "QST" an excellent article by McMurdo Silver, in which he described a V.T.V.M. which has become the basis of practically all current designs. Subsequently a series of three articles in "A.R." covered the same ground but dealing with some modifications to suit locally available parts. Despite the interest shown at the time and the extreme versatility of the instrument, very few have been constructed by Amateurs. Those few who have built them are loud in their praise for what constitutes a universal tool for the shack, test bench or laboratory.

It is probable that the complexity of the de luxe instrument has deterred many would-be constructors. The V.T.V.M. here described is an attempt to overcome these complexities without seriously detracting from the versatility of the instrument or adversely affecting the stability and accuracy achieved in the original instrument. The present design is also very much smaller.

The basic principles of the present instrument are the same as those of the larger de luxe model and the reader is referred to the previously mentioned articles for a discussion of the theory behind the design.

The basis of the V.T.V.M. is a balanced electronic bridge consisting of two triodes plus a sensitive meter to read the out of balance current. The use of the balanced circuit allows wide power supply voltage variations without shifting the meter zero, the instrument therefore being free from drift.

In the McMurdo Silver V.T.V.M. the first twin triode acted as the bridge and was run at very low plate voltage. This, whilst having considerable advantage in reducing the effects of gas current, means that very small changes in plate current result from the application of changing voltages to the grid. Thus, there is not sufficient current available to operate the meter, so a second twin triode stage was used to act as d.c. amplifier or meter actuating tube, allowing the use of a relatively insensitive meter.

The present design overcomes the need for a second stage with all the attendant complications. Four things are done to overcome the need for a d.c. amplifier.

1. The plate voltage of the bridge tube is increased.
2. A more sensitive meter is used.
3. The total resistance between grid and ground is reduced.
4. The heater voltage of the twin triode is reduced.

Experiments with increased plate voltage showed that no appreciable change took place in gas current effects provided the input resistance was lowered. Originally, the de luxe instrument had a maximum resistance of 40 megohms between grid and ground. This is unnecessarily high for most work so that the more conventional input resist-

ance of 11 megohms is used, with a consequent decrease in grid current effects.

A further improvement is effected by reducing the cathode temperature of the bridge tubes by a reduction in heater voltage to approx. 4.5v. This allows the plate voltage to be increased to a point where sufficient plate current change is available to operate a microammeter. The use of a 0-100 microamp. meter is no particular disadvantage as the extra cost is more than saved by the reduction in components brought about by omitting the meter actuating tube. Meter manufacturers advise that down to 100 microamps. f.s.d. the ruggedness and reliability of a meter does not materially deteriorate.

It may be seen then that the only disadvantage shown by this design is the very slight one of reduced input resistance, and as already pointed out, this is not at all serious for general work. If, however, the need should ever arise for a very high input resistance, it may be readily achieved by adding multiplier resistances to the probe. Thus a x5 multiplier gives a total input resistance of 55 megohms for a f.s.d. of 7.5v. For most work, the 11 megohm input resistance is ample.

In the interests of simplicity, the d.c. current ranges were dropped from the present design, the standard multiplier being the most useful for measurement of current. Also the multiplier

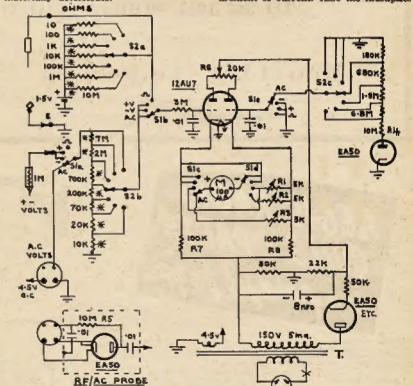


Fig. 1.—Schematic of V.T.V.M.

All resistors marked * are of low tolerance (1% or better). R7 and R8 need not be 1% types, but should be equal in value to maintain a balance in the meter circuit.

R4 should be adjusted in value to give a balance (zero) on the a.c. volts range, 1.5v. R5 may need to be smaller in order to obtain sufficient deflection of the meter when measuring a.c. voltage. It should, however, be kept as high as possible. Changes in the value of R5 will require a change in the value of R4 to maintain balance.

The potentiometers R1, R2, and R3 are the calibration controls. Only one, R2, should be brought to the front panel. R1 is "d.c. volts" calibration, R2 is the "ohms zero" set, R3 is the "a.c. volts" calibration.

R5 is used to balance the bridge, i.e. zero the meter, and is mounted on the front panel.

S1a-e is the function switch, 2 pole 4 position 3 bank.

S2a-c is the range switch, single pole 7 position (or 12 position) 3 bank.

S1 and S2 may be of the ordinary Oak type bakelite wafer switches.

T is the power transformer, shown as 150v. at 3 Ma. This will probably have to be a 150v./150v. 30 Ma. type, using only one half of the secondary. The 4.5v. required will therefore require a dropping resistor from 6.3v. as explained in the text.

The meter M should be as large as possible and scaled 0-15 and 0-5 with the added ohms scale according to Table 1.

*21 Sutherland Street, Lane Cove, N.S.W.

JUST OUT! VOLUME 13 (1954 CIRCUITS)

AUSTRALIAN OFFICIAL

RADIO SERVICE MANUAL

Price 24/- plus 1/- Postage

Here, in compact, easily-referred-to form, are the circuits of Australia's 1954 Radio Receivers, together with component values and service data.

**336 PAGES OF COMPLETE REFERENCE
TO 363 1954 MODELS AND 34 BRANDS**

OBTAIN YOUR COPY NOW FROM—

McGILL'S Authorised Newsagency

Est. 1860

183-185 ELIZABETH STREET, MELBOURNE, C.1, VICTORIA.

"The Post Office is opposite"

Phone: MY 1475-7

**AEGIS RADIO
COILS & PARTS**
do a grand job for you!

DURING WINTER, you'll want to get down to it and build your own high quality amplifier or radio equipment. But be sure you stipulate AEGIS components from your favourite dealer. AEGIS is tops in quality and performance. Here are some from our range.

**AEGIS MIDGET
COILS AND L.F.
TRANSFORMERS**

Type M24 Aerial Shielded Perm. Iron Core.
Type M25 R.F. Shielded Perm. Iron Core.
Type M26 A Osc., Shielded Perm.—SANT.
Type M28 B Osc., Shielded Perm.—EBS.
Type M29 C Osc., Shielded Perm.—JRS.
Type M30 D Osc., Shielded Perm.—GAK.

**L.F.
TRANSFORMERS
DUAL WAVE
KITS**

Type J23 General Purpose 455 Kc. Midget Perm.
Type J30 Battery 1-1 valve 455 Kc. Midget Perm.
Type J9 Standard 455 Kc.
Type KIM Midget Dual Wave for SANT or GAK only.
Size: 3/4 x 1 1/4 x 1 1/4 inches.

For full technical information write to—

AEGIS MFG. CO. PTY. LTD.
208 LIT LONSDALE STREET, MELBOURNE, VIC.

Telephone: FB 2721 (3 lines)

If difficulty experienced obtaining supplies, contact nearest Aegis Distributor:
N.S.W.: WATKIN WYNNE, Nth. Sydney.
Sth. Aust.: GEO. PROCTER, Adelaide.
Qld.: CHANDLER, Brisbane.
West. Aust.: A. J. WYLLIE, Perth.



TUNING KNOBS, Large and Small, Bakelite.
RESISTOR STRIPS
PACKAGED HARDWARE

CERAMIC INSULATORS
Complete range of stand-off and feed-through types.

terminals and resistances were omitted, the existing ranges covering all voltages liable to be encountered.

No special switches are required. In the larger instrument, the use of a very high resistance stick in the voltage divider dictated the use of low loss ceramic switches, however with only a total of 11 megohms in the resistance stick, ordinary bakelite wafer switches are quite in order.

Further simplification results from the use of single $\frac{1}{2}$ watt resistors in the voltage dividers. These may be high stability 1% tolerance types or they may be selected for low tolerance. The size of the constructor's pocket will probably decide the issue!

CIRCUIT DETAILS

The circuit diagram of the V.T.V.M. is shown in Fig. 1. The 12AU7 acts as the balanced bridge tube, the voltages to be measured being applied to the grid of the left hand triode. D.C. voltage ranges are provided by switching up and down the voltage divider, which has a total resistance of 10 megohms. A 1 megohm resistor is housed in the probe to act as an isolating resistance so that circuit constants are not upset by application of the probe.

Switching the function switch to "Ohms" provides a very convenient set of resistance ranges in decade fashion with centre scale readings ranging from 10 ohms to 10 megohms. A.C. and r.f. voltages require the use of the external probe. Here again a change was made in the design compared to the original instrument.

By the use of a ceramic coupling condenser of 0.01 μ F, the probe becomes suitable for both low frequency a.c. measurements and r.f. measurements. The inductance of these condensers is

OHMS CALIBRATION

| Ohms | Volts | Ohms | Volts | Ohms | Volts |
|------|-------|------|-------|------|-------|
| 0.5 | 24 | 8.5 | 230 | 35 | 389 |
| 1.0 | 45.5 | 9.0 | 237 | 40 | 400 |
| 1.5 | 85 | 9.5 | 248.5 | 45 | 408 |
| 2.0 | 83.5 | 10 | 250 | 50 | 417 |
| 2.5 | 100 | 11 | 262 | 60 | 428 |
| 3.0 | 115.5 | 12 | 272.5 | 70 | 438 |
| 3.5 | 130 | 13 | 282.5 | 80 | 444 |
| 4.0 | 143 | 14 | 291.5 | 90 | 450 |
| 4.5 | 155 | 15 | 300 | 100 | 455 |
| 5.0 | 168.5 | 16 | 309 | 200 | 478 |
| 5.5 | 177.5 | 17 | 315 | 300 | 484 |
| 6.0 | 187.5 | 18 | 321 | 400 | 488 |
| 6.5 | 197 | 19 | 327.5 | 500 | 490 |
| 7.0 | 206 | 20 | 333.5 | 1000 | 495 |
| 7.5 | 214 | 25 | 356 | Inf. | 500 |
| 8.0 | 222 | 30 | 375 | | |

Table 1.

The figures in the OHMS column are marked above the appropriate points on the voltage scale, as given by the VOLTS column. The resultant scale of ohms represents the OHMS $\times 1$ range. Any convenient full scale voltage figure may be chosen to work out the ohms scale, the one above being 500. The formula from which the above table was prepared is—

$$M = \frac{FSD \times R}{r + R}$$

Where
M is the meter reading in volts.
FSD is the chosen scale deflection (e.g. 500 as in above Table).

R is unknown or external resistance being calibrated.

r is internal resistance selected by range selector (e.g. for ohms $\times 1$ the internal resistance is 10 ohms).

low so that error on r.f. measurement is kept low, whilst the capacity is sufficiently high to prevent any error due to capacitive reactance at low frequencies. It is possible that the single condenser may be running close to the wind on very high voltages, but no trouble has been experienced to date. The use of germanium diodes in the probe was considered but discarded due to the low inverse peak voltage permitted with such rectifiers. However, for measurement of fairly small voltages (25v. or so) the germanium diodes would probably give more accurate readings at fairly high radio frequencies.

No "A.C. Zero" control is fitted as it was found quite in order to adjust the series resistance in the balancing diode and leave it set. In any case, due to the high resistances in use, an a.c. zero control would require a fairly high resistance potentiometer which might be hard to obtain.

The power supply is simple as there are no voltages to be obtained for a meter actuating tube. The rectifier may be a half wave selenium type, or as shown, some small diode such as another EA50 or 6H6, etc. The 150 volt 30 Ma. transformer may be replaced by something smaller if facilities for making transformers are available. The secondary, which is not centre tapped, is only called on to supply about 5 Ma., so the 30 Ma. winding is much larger than required. The heater voltage may be obtained from a 5v. winding if the transformer has one, or a series resistor may be used to drop the voltage to somewhere between 4 and 5 volts. The exact voltage is not at all critical.

value, however, will only be correct when measuring pure sine waves. Peak to peak values will be 2.8 times the r.m.s. reading as shown by the meter, and will be correct. To illustrate this, assume the voltage shows 10v. on the meter, this is the r.m.s. voltage of a pure sine wave, but the same reading on a short duration pulse waveform is not the true r.m.s. value. However, in each case, the peak to peak value of 28 volts is correct.

No calibration is required on the ohm ranges, setting the "Ohms Adj." to full scale accomplishes this. Note that the meter is forward reading for ohms. The meter scale may be graduated in ohms by the use of Table 1. Alternatively, it may be possible to obtain a scale suitably calibrated, as at least one popular commercial instrument uses the same scaling. Other scalings may be used by suitable alteration of the voltage divider stick, but the ones shown are very convenient. Table 2 shows the full set of ranges available.

CONSTRUCTION

The instrument may be housed in quite a small space, which is a decided advantage not possessed by the McMurdo Silver V.T.V.M. This allows moving the meter to the job rather than bringing the job to the meter! The prototype was housed in a case 6" x 6" x 6"; a commercially made case and panel is available in this size.

No actual layout is suggested as this is not critical, the only points to be watched being the mounting of the resistors for the various ranges and the location of the grid by-pass condensers.

TABLE OF RANGES

| Function Switch | Range Switch Positions | | | | | | |
|--------------------|------------------------|-------------|--------------|-------------|--------------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | Full Scale Readings | | | | | | |
| Volts A.C. | 1.5 | 5 | 15 | 50 | 150 | 500 | 1,500 |
| Volts D.C. — | | | | | | | |
| Volts D.C. + | | | | | | | |
| Ohms | $\times 1$ | $\times 10$ | $\times 100$ | $\times 1k$ | $\times 10k$ | $\times 100k$ | $\times 1meg$ |
| Full Scale Reading | 1k | 10k | 100k | 1meg | 10meg | 100meg | 1000meg |
| Half Scale Reading | 10 | 100 | 1k | 10k | 100k | 1meg | 10meg |

Table 2.

* Switch Labels

CALIBRATION

Once having got the instrument ready for action, first switch the function switch to d.c. volts, either positive, or negative. Now apply a fresh 1.5v. torch cell between the probe and earth and adjust the d.c.v. calibration potentiometer so that the meter just reads full scale on the 1.5v. scale. The whole set of d.c. volt ranges should now be correct.

Calibration of the a.c. volt ranges is accomplished in the same manner except that a source of a.c. voltage of known value is applied to the a.c. probe. The lowest range of a.c. volts (0-15v.) will not be quite linear, but it was not thought worthwhile to include a special scale. For this reason the a.c. ranges should be calibrated using a voltage source of something larger than 1.5v.

It should be pointed out that the instrument reading is proportional to the peak value of the applied a.c. voltage, though the calibration is most useful in terms of r.m.s. voltage. The r.m.s.

All resistors in the divider sticks, and also the ohms ranges, should be mounted on low-leakage material—mounting them on the switch banks is recommended, whilst the grid by-pass condensers should be mounted right at the grid pins to keep r.f. away from the grids during measurements around a transmitter.

Panel layout is conventional and the only controls brought to the front panel are the two switches, meter zero and ohms adjustment potentiometer. All other controls are of the screw-driver adjust type and may be located inside the case. It is not necessary to use shielded leads for the probes, but it is important that the components of the a.c. probe be shielded and the shield earthed. For convenience and safety in measuring high voltages, the d.c. probe may use small section co-axial cable with the shielding braid earthed. The case of the instrument should be earthed via the usual three core flex.

(Continued on Page 11)

AN INTRODUCTION TO TWO METRES

BY ROBERT H. BLACK,* VK2QZ

DESPITE the belief of the low frequency Amateur that there could not possibly be so few metres, there really is a two-metre band. It is hoped that this introduction will acquaint future denizens of the band with some of the inner mysteries of this microcosm.

Before we proceed further we must define two metres: Two metres is 2 m and a little rough calculation will show that it is 144 megacycles per second (i.e. 144,000 Kc.). In earlier times the calculation was rougher and two metres was 166 megacycles. As the transmitters were modulated oscillators the slight inaccuracy did not matter. Nowadays, when you have your crystal controlled transmitter operating in the band, you are much more aware of your exact frequency than are those who operate on the lower frequencies.

The types you will meet on two metres are diverse. Some are browned-off old-timers who want to get away from it all, others are serving their time with "Z" calls, perhaps still trying to learn Morse, whilst another group regard two metres in the same way as a small boy dismembering his first alarm clock. These last are addicts. Others, again, are experimenters who write technical articles.

Before you can get going on two metres you must first of all find the band. This is an ordeal which must be endured by all who build their own equipment. It applies to both receivers and transmitters. The best receiver for two metres is a crystal controlled converter with a cascade in Sydney and a neutralised 6J6 in Melbourne as the front end. The views on the comparative excellence of these front ends are just as fixed as the opinions on the Melbourne climate and the Yarra River. Perhaps there are frequent meteor showers in Victoria, perhaps "QST" is read in one State and "CQ" in the other, perhaps no comparison has been made between the best gear in both States.

You will hear *noise figures* quoted; these are of academic interest unless you live in such seclusion that you see only one car a fortnight. Most Amateurs live in locations where *noise* (unfigured) is going to limit their reception rather than the nice distinction of 1 db. improvement in the noise figure. Noise will drive you or the XYL silly if you live in the city, where you will have to try all the noise limiters in the books and the magazines before you settle on your favourite. By the time you have tried all the various circuits you will have become accustomed to the noise anyhow and your wife will have left you.

In a crystal controlled converter you will use an *overtone crystal oscillator* and here there are three circuits, at least, to try before you find that your crystal is inactive on the particular overtone you want to use. If you have an active crystal, the circuit doesn't matter.

Well, you will eventually find the two metre band with your receiver after coming across the national f.m. broadcast transmitter and odd service signals including the N.R.M.A. These last signals may intrigue you so much that you won't persevere with the quest for two metres. But don't be waylaid; you will probably hear them again when you have found the band. It is handy to feed the converter into the receiver near your favourite short wave station so that you can listen to it during the periodic depressions when you want to hear a new voice for a change.

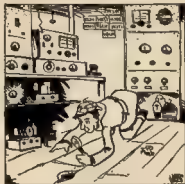
The two metre transmitter is quite different from the usual set-up on the

lower frequencies. Instead of using tubes which will deliver adequate output to drive the next frequency multiplier, you must use small tubes, triodes at that, and squeeze and squeeze them in the effort to obtain enough grid drive to the final amplifier, and when the grid current reaches the right value it will mostly be due to oscillation. This is a matter of honour; the fellow who designs a transmitter with drive to spare is a cad. The caddish approach is advised.

Finding the band with the transmitter can be attempted in one of two ways. The cognoscenti use a grid dip oscillator, whereas the others obtain output from the final and call CQ. These innocents find themselves tangled up with aircraft, taxi cabs or fire brigades and, even if they don't cause trouble, will certainly call their heads off and receive no answer on two metres as they are on ninety-six megacycles or thereabouts.

If you want to have any contacts on two metres you will have to use telephony. The "Z" calls are on two metres because they did not sit for a Morse examination, and the ex-low frequency phone stations haven't a key in the shack and forgot Morse years ago! When you graduate to working two metre DX, you may use a Morse key, but this will only be when you have a big signal.

F.m. is much cheaper to put in the transmitter than a.m. Strangely enough, these characters who spend weeks hunting for grid drive won't spend an hour or two putting a discriminator in their receivers so you will have to put up



"... Two Metres—You must first of all find the band."

RADIO HAMs!

TUNE INTO HI-FI

Revamp your Modulator and thrill to the wonder of amazingly improved sound by installing the new, sensational 8" High Fidelity Loudspeaker with a frequency range of 40-5,000 c.p.s.—the remarkable . . .

GOODMANS AXIETTE 101

Here's a five watt Loudspeaker that's a precision instrument of the finest standard . . . a Loudspeaker that will improve any Receiver or Amplifier beyond recognition.

Ask U.R.D. for a price on the minimum HI-FI Kit.

UNITED RADIO DISTRIBUTORS PTY. LTD.
175 Phillip St., Sydney. Phone: BL 3954



* "The Chalet," 2 Yerton Ave., Hunter's Hill, N.S.W.

with execrably funny comments about your type of modulation.

Another approach is to use your 100 watt modulator from the low frequency transmitter and bore it into the 25 watt two metre rig. When you have fixed the radio frequency feedback you will have a nice wide signal with a few extra ones on each side. This helps to occupy the band.

For an aerial you will have a beam. It is conventional to use horizontal polarisation to stop your signals going over hills and down the other side. This diminishes the amount of interference. Horizontal polarisation also necessitates more ingenuity and trouble in mobile work and is therefore highly desirable. A simple beam is advisable at first; many complicated ones have been found to be only as effective as a dipole. If you are building a tower make sure that you have adequate space to accommodate it when it falls down in the wind.

You should really have some form of frequency measuring device—the minimum requirement is a set of **lecher lines** (the "h" is pronounced as a "k"), but between contacts you will have plenty of time to build a complicated heterodyne frequency meter. A phone monitor would be regarded with some suspicion and any tendency for this sort of thing to appear might start an evacuation to the one metre band. You will find that distortion, hum, splatter, parasites, frequency drift and the like don't seem to cause much trouble on two metres.



"... Fox Hunts are designed to encourage driving at high speed."

All is now ready. You call CQ and your first Sunday night on the band will bring a host of contacts—there is a new signal on the band. Please don't expect it to last; but your popularity will recur periodically during **Scrambles**, which are contests arranged so that you have an excuse to finish the contact quickly and get on with the next. This gets all your duty calls over in one night and you can then go back to nightly contacts with your personal friends.

Frequencies are subject to personal ownership on two metres and only the lowest megacycle is used. If your crystal lands on someone else's frequency and he has a big signal, you will need another eight megacycle crystal. If you have the big signal and he doesn't, then he will be looking for a new crystal. This is very convenient as you don't have to listen on your own frequency before you transmit.

Before long you will become entangled in a technical discussion type of contact. This consists of designing a new portable transmitter with fewer and smaller tubes to give greater output with less battery drain, or a new beam with an impossible number of elements. You must keep yourself well amused during the other fellow's over or you will go to sleep. To obviate this, a technique was invented called **cross band operation**. Here it is good manners to answer questions occasionally, even if you are busy with some intricate bit of soldering.

Field days using portable and mobile equipment were introduced by those living in noisy locations with no domestic responsibilities. A variety of this type of activity is the fox hunt, designed to encourage car driving at high speed; being booked is the equivalent of being thrown at a jump.

After you have made all your over-the-back-fence contacts you will be looking for two metre DX. This is the big test, but not of your equipment. Despite the permissible 100 watts, a beam of unbelievable gain, and a receiver with a fractional noise figure, you will not work DX if you have a bad location except once in a pink aurora. So you build an eighty metre transmitter and talk to the two metre DX stations on that band, or you learn Morse, drop the "Z" (if you have one) from your call sign, and go hunting the real thing on twenty metres.

This is not, of course, the whole story. It would be absurd to suppose that anyone would build expensive and complicated equipment merely to have two or three contacts a week. When I have finished reading this book by Dale Carnegie I may have an odd moment in the social whirl of two metres to tell you more about this band.

PRACTICAL VACUUM TUBE VOLTMETER

(Continued from Page 9)

This offers the convenience of single probe operation where equipment is already earthed.

PUTTING THE V.T.V.M. TO USE

The uses of the V.T.V.M. are too numerous to list in detail, but the reader is assured that the time and effort put into the construction of such an instrument is well worth while. Typical jobs made easy are: Receiver alignment, using the d.c.v. ranges to read a.v.c. or diode load voltages; transmitter setting up, using the d.c.v. ranges to check grid voltage, thus checking grid drive without having to break the earth return of the grid leak and insert a meter; checking voltages in resistance coupled amplifiers; measuring the gain of amplifier stages by checking a.c. volts in against a.c. volts out.

These are just a few of the multitude of uses to which this instrument may be put. In fact, having built a V.T.V.M., the usual thing is that the constructor begins to wonder how he ever got along without one!

In conclusion, it must be mentioned that the instrument just described is not claimed to be superior to the de luxe V.T.V.M. described in the references, except in size and convenience. The large instrument has more ranges

covering also d.c. milliamperes, as well as having a very high input resistance. It is, as its name implies, a de luxe instrument. The present instrument is a practical every-day tool, easy to build, easy to get going and easy to use, designed to fill the same place as the well known multimeter, but with all the advantages possessed by a V.T.V.M.

For those wanting the very best in V.T.V.M.'s, and not worried by size or complexity, then the McMurdo Silver job would be the logical choice; the smaller version will, however, probably appeal to the majority of Amateurs.

REFERENCES

- 1 "Taming the Vacuum Tube Voltmeter," McMurdo Silver, Part 1, July, 1945, "QST", Part 2, August, 1945, "QST".
- 2 "A De Luxe Vacuum Tube Voltmeter," J. C. Duncan, "Amateur Radio," January, March, 1949.

Low Drift Crystals

FOR
AMATEUR BANDS

ACCURACY 0.02% OF
STATED FREQUENCY

3.5 Mc. and 7 Mc.

Unmounted £2 0 0

Mounted £2 10 0

12.5 and 14 Mc. Fundamental
Crystals, "Low Drift,"
Mounted only, £5.

Spot Frequency Crystals
Prices on Application.

Regrinds £1 0 0

THESE PRICES DO NOT
INCLUDE SALES TAX.

MAXWELL HOWDEN
15 CLAREMONT CRES.,
CANTERBURY, E7,
VICTORIA

6146 Beam Power Amplifier Data

Cathode. Oxide coated. Indirectly heated.

Heater: Voltage (AC or DC) 6.3 volts \pm 10%.

Current 1.25 amps \pm 0.075 amp.

Maximum voltage between heater and cathode: 135 volts (DC).

Capacitances (without external shield; base pin No. 8 earthed):

Grid to Plate = 0.22 pF.

Grid to Cathode = 13.5 \pm 2.4 pF.

Output = 8.5 \pm 2.1 pF.

Useful Power Output: Minimum 47.5 watts.

Maximum Circuit Values (C.C.S. or I.C.A.S. conditions*)

Grid resistance equals maximum of 30,000 ohms.

When grid is driven positive and the 6146 is operated at maximum ratings, the total grid DC circuit resistance should not exceed the specified value of 30,000 ohms. If this value is insufficient to provide adequate bias, the additional required bias must be supplied by a cathode resistor or fixed supply. For operation at less than maximum ratings, the grid DC circuit resistance may be as high as 100,000 ohms.

* C.C.S.—Continuous Commercial Service.

I.C.A.S.—Intermittent Commercial and Amateur Service.

AF POWER AMPLIFIER AND MODULATOR CLASS AB1 AND AB2

MAXIMUM RATINGS, absolute values.

| | Class AB1 Triode | | Class AB1 | | Class AB2 | |
|---------------------------------|---------------------|-----------|-----------|----------|-----------|----------|
| | C.C.S. | I.C.A.S. | C.C.S. | I.C.A.S. | C.C.S. | I.C.A.S. |
| Anode voltage .. | 400 | 400 | 800 | 750 | 600 | 750 |
| Screen voltage .. | connected | connected | 250 | 250 | 250 | 250 |
| Anode current, max. signal .. | 90 | 90 | 125 | 135 | 125 | 135 |
| Max. signal anode input (1) .. | 35 | 35 | 60 | 85 | 62.5 | 90 |
| Max. signal screen input (2) .. | — | — | 3 | 3 | 3 | 3 |
| Anode dissipation (3) max. .. | 20 | 25 | 20 | 25 | 20 | 25 |

TYPICAL OPERATION (Values are for two tubes)

| Class AB1—Triode Connection | | | |
|--|--------|--------|----------|
| | C.C.S. | C.C.S. | I.C.A.S. |
| Anode voltage .. | 250 | 400 | 400 |
| Grid No. 1 voltage .. | —50 | —100 | —100 |
| Peak input between grids .. | 100 | 200 | 200 |
| Anode current, zero signal .. | 110 | 80 | 80 |
| Anode current, max. signal .. | 144 | 136 | 136 |
| Effective load resistance, anode to anode .. | 5000 | 8000 | 8000 |
| Max. signal driving power .. | 0 | 0 | 0 |
| Harmonic distortion .. | 5 | 4.8 | 4.8 |
| Output power (max. signal) .. | 8 | 19 | 19 |

| Class AB1—Tetrode Connection | | | |
|--|--------|--------|----------|
| | C.C.S. | C.C.S. | I.C.A.S. |
| Anode voltage .. | 400 | 500 | 600 |
| Screen voltage (1) .. | 180 | 180 | 180 |
| Grid No. 1 bias (2) .. | —40 | —40 | —50 |
| Peak input between grids .. | 80 | 80 | 100 |
| Anode current, zero sig. .. | 228 | 220 | 220 |
| Screen current, zero sig. .. | 2 | 1.4 | 1.2 |
| Screen current, max. sig. .. | 30 | 19.5 | 25.2 |
| Effective load resistance, anode to anode .. | 4000 | 5000 | 7500 |
| Max. sig. driving power .. | 0 | 0 | 0 |
| Harmonic distortion .. | 8 | 8 | 7.5 |
| Output power (max. signal) .. | 55 | 70 | 82 |

Maximum Circuit Values for above conditions (see note 1):

Grid No. 1 circuit resistance, with fixed bias 8.1 megohm max.

With cathode bias (triode connection only): 0.5 megohm.

Cathode bias not recommended for tetrode connection.

(1) Preferably obtained from a separate source or from the anode voltage supply with a voltage divider.

(2) From fixed bias source.

Cap .. 3/8" dia.

Socket .. 5003/12/C

Bulb temperature, maximum .. 220°C.

Mounting position .. any

Overall length, .. 3-11/16" \pm 1/8"

Seated length 3-1/8" \pm 1/8"

Maximum diameter 1-23/32"

Shipping weight .. 4 oz.

Net weight .. 3 oz.

Base .. Octal

Pin 1 } Cathode, Suppres-

Pin 4 } sor, and Internal

Pin 6 } Shield.

Pin 2 } Heater

Pin 7 } Screen grid.

Pin 5 } Grid.

Pin 8 } Base sleeve.

Cap —Anode.

AF POWER AMPLIFIER AND MODULATOR CLASS AB2

MAXIMUM RATINGS, absolute values

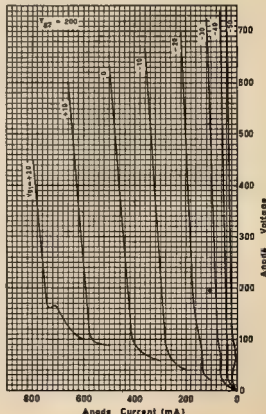
| | C.C.S. | I.C.A.S. |
|-----------------------------------|--------|----------|
| Anode voltage, maximum .. | 800 | 750 |
| Screen voltage, maximum .. | 250 | 250 |
| Anode current, max. signal (3) .. | 125 | 135 |
| Max. signal anode input (1) .. | 62.5 | 90 |
| Max. signal screen input (2) .. | 3 | 3 |
| Anode dissipation (3) max. .. | 20 | 25 |

6146

Page 6



AVERAGE CHARACTERISTICS (V_{g1} as variable)



AF Power Amplifier and Modulator, Class AB2 (continued)

TYPICAL OPERATION (values are for two tubes)

| | C.C.S. C.C.S. | | C.C.S. I.C.A.S. I.C.A.S. | |
|--|---------------|------|--------------------------|------------|
| Anode voltage | 400 | 500 | 600 | 750 volts |
| Screen voltage (1) | 175 | 175 | 185 | 165 volts |
| Grid No. 1 bias | -40 | -40 | -45 | -45 volts |
| Peak input between grids | 88 | 87 | 89 | 113 volts |
| Anode current, zero sig. | 83 | 64 | 31 | 41 Ma. |
| Anode current, max. sig. | 232 | 242 | 207 | 270 Ma. |
| Screen current, max. sig. | 1.5 | 1.2 | 0.7 | 0.6 Ma. |
| Screen current, max. sig. | 28 | 28 | 31 | 21 Ma. |
| Max. grid current for max. signal | 0.3 | 0.3 | 0.5 | 0.7 Ma. |
| Effective load resistance anode to anode | 4000 | 5000 | 7500 | 8000 ohms |
| Driving power on grids (2) | 0.01 | 0.01 | 0.02 | 0.03 watts |
| Harmonic distortion | 9.7 | 9.7 | 9.7 | 11 % |
| Maximum power output | 60 | 81 | 90 | 130 watts |

Maximum Circuit Values (see note 5):

Grid resistance with fixed bias 30,000 ohms max. (cathode bias not recommended).

(2) Averaged over any audio frequency cycle of sine wave form.

(3) From fixed bias source.

(4) Driver stage should be capable of supplying the specified driving power at low distortion to the control grids of the AB2 stage. To minimize distortion, the effective resistance per control grid circuit of the AB2 stage should be held at a low value. For this purpose, the use of transformer coupling is recommended. In no case, however, should the total control grid DC circuit resistance exceed 30,000 ohms when the 6146 is operated at maximum ratings. For operation at less than maximum ratings, the DC circuit resistance may be as high as 100,000 ohms.

(6) The type of input coupling network used should not introduce too much control grid circuit resistance. Transformer or impedance coupling devices are recommended. When control grid is operated in the negative region with fixed bias, the control grid circuit resistance should not exceed 81 megohm. For higher values of this resistance, cathode bias is required. Under no circumstances should the total control grid circuit resistance exceed 85 megohm.

ANODE MODULATED RF POWER AMPLIFIER

Class C Telephony

Carrier conditions per tube for use with maximum modulation factor 1.0

MAXIMUM RATINGS, absolute values

| | C.C.S. C.C.S. | | I.C.A.S. I.C.A.S. | |
|--------------------|---------------|------|-------------------|------------|
| Anode voltage | 400 | 400 | 600 | 600 volts |
| Screen voltage | 250 | 250 | 250 | 250 volts |
| Grid bias | -150 | -150 | -150 | -150 volts |
| Anode current | 3.5 | 3.5 | 4.0 | 4.0 Ma. |
| Anode input power | 45 | 45 | 67.5 | 67.5 watts |
| Screen input power | 2 | 2 | 2 | 2 watts |
| Anode dissipation | 13.3 | 13.3 | 16.7 | 16.7 watts |

TYPICAL OPERATION

| | C.C.S. C.C.S. | | I.C.A.S. I.C.A.S. | |
|----------------------------|---------------|-------|-------------------|------------|
| Anode voltage | 400 | 475 | 600 | 600 volts |
| Screen voltage (7) | 180 | 185 | 180 | 180 volts |
| Screen series resistor (7) | 21500 | 26500 | 37500 | 37500 ohms |
| Grid bias (8) | -85 | -85 | -85 | -85 volts |
| Grid resistor (8) | 2800 | 28500 | 28300 | 28300 ohms |
| Peak RF input | 109 | 99 | 100 | 100 volts |
| Anode current | 112 | 94 | 113 | 113 Ma. |
| Screen current | 11.8 | 12.8 | 12 | 12 Ma. |
| Grid current (approx.) | 3 | 3 | 3 | 3 Ma. |
| Driving power | 0.3 | 0.3 | 0.3 | 0.3 watts |
| Output power | 34 | 33 | 62 | 62 watts |

Maximum Circuit Values: Maximum grid resistance: 30,000 ohms.

(7) Obtained preferably from a separate source modulated with the anode supply, or from the modulated anode supply through a series resistor.

(8) Obtained from grid resistance or from a combination of grid resistance and either fixed supply or cathode resistor.

RF POWER AMPLIFIER AND OSCILLATOR

Class C Telephony

Key down conditions per tube without amplitude modulation. Amplitude modulation essentially negative may be used if the positive peak of the AF envelope does not exceed 115% of the carrier conditions.

Class C, FM Telephony

MAXIMUM RATINGS, absolute values

| | C.C.S. C.C.S. | | I.C.A.S. I.C.A.S. | |
|-------------------|---------------|------|-------------------|------------|
| Anode voltage | max. | 600 | 750 | 750 volts |
| Screen voltage | max. | 250 | 250 | 250 volts |
| Grid bias | max. | -150 | -150 | -150 volts |
| Anode current | max. | 140 | 150 | 150 Ma. |
| Grid current | max. | 3.5 | 4.0 | 4.0 Ma. |
| Anode input | max. | 67.5 | 90 | 90 watts |
| Screen input | max. | 2 | 2 | 2 watts |
| Anode dissipation | max. | 20 | 25 | 25 watts |

TYPICAL OPERATION AS AMPLIFIER

(at given maximum frequencies)

| | Maximum Frequency | | | | Min. Freq. | |
|------------------------|-------------------|--------------|--------------|--------------|---------------|---------------|
| | up to 50 Mc. | up to 60 Mc. | up to 70 Mc. | up to 80 Mc. | up to 175 Mc. | up to 175 Mc. |
| Anode voltage | 500 | 600 | 600 | 750 | 320 | 400 volts |
| Screen voltage (9) | 170 | 150 | 160 | 160 | 180 | 200 volts |
| Screen series resistor | 29200 | 40200 | 28000 | 40100 | 15500 | 22200 ohms |
| Grid bias (10) | -85 | -85 | -85 | -85 | -54 | -54 volts |
| Grid resistor (10) | 28300 | 28300 | 28300 | 28300 | 30000 | 30000 ohms |
| Cathode res. (10) | 570 | 670 | 510 | 620 | 360 | 385 ohms |
| Peak RF input | 99 | 100 | 102 | 100 | 70 | 70 volts |
| Anode current | 135 | 113 | 150 | 120 | 140 | 150 Ma. |
| Screen current | 11.8 | 11.2 | 15 | 14.7 | 9 | 9 Ma. |
| Grid current | 3 | 3 | 3 | 3 | 1.8 | 1.8 Ma. |
| Driving power | 0.3 | 0.3 | 0.3 | 0.3 | 2 | 2 watts |
| Output power | 50 | 52 | 69 | 68 | 25 | 35 watts |

(9) Obtained preferably from a separate source, or from the anode supply voltage with a voltage divider, or through a series resistor. A series resistor in the screen grid circuit should be used only when the 6146 is used in a circuit which is not keyed. The screen voltage must not exceed 400 volts under key-down conditions.

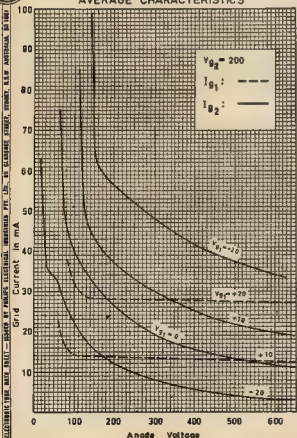
(10) Obtained from fixed supply, by control grid resistor, by cathode resistor or by combination methods.



6146

Page 7

AVERAGE CHARACTERISTICS



VICTORIAN ALL MODELS EXHIBITION

The All Models Exhibition and International Trade Fair will take place from 25th August to 10th September at the Exhibition Buildings, Melbourne. The exhibition on this occasion has been enlarged to take in the international side of things and it is anticipated that 250,000 people will pass through the turnstiles.

The Victorian Division of the Wireless Institute of Australia will again be taking the main stage as their exhibiting space and the organiser, 3LN, is most anxious to have the co-operation of Interstate Amateurs to maintain contacts during this exhibition.

VK3WI will be on the air simultaneously for the duration of the show on 2, 20, 40 and 80 metres and any contacts would be greatly appreciated.

Please remember that your side of the transmission will be relayed into the hall and please do not use abbreviations, but endeavour to make the transmission suitable in nature for audience participation.

VK3WI will be on the air each day excepting the Sundays from approximately 12 midday until 10 p.m. each night. Please make a note in the log of these times and dates, when your contacts with VK3WI will be greatly appreciated by the gang operating at the exhibition.

120W. OF AUDIO WITHOUT DRIVING POWER

(Continued from Page 41)

cause of the heavier drain on the power supply, and appears practically entirely in the modulator output and not in the earlier stages. At this level the signal-to-hum ratio is over 30 db. With voice input and gain adjusted for full output on peaks, the drain on the supply is considerably less and hum is not observable.

With sine-wave input, the plate current at full output is 240 Ma. when the load is adjusted to the appropriate value for the plate voltage in use, as listed earlier. This maximum current is practically the same at all plate voltages listed, since the plate dissipation rating of the 8146 does not permit using a bias value that gives a very large value of no-signal plate current. The grid bias should be adjusted for a total plate current that represents a no-signal input of slightly under 50 watts at the particular plate voltage used.

The voltage gain from the microphone input to the modulator grids is such that full output can be secured with an input voltage of about 3 millivolts, r.m.s. This is of the order of one-tenth the voltage available from a crystal microphone with close talking.

LET'S BUILD A TOWER

(Continued from Page 5)

the four legs, temporary cross braces of 2" x 1" x 10' karri nailed to the legs on the ground and up the tower to their opposite partners above, and the gang

who had now completely exhausted their excuses, assembled for the big day.

Eight Amateurs, one block and tackle, one cement mixer (the man next door) and one XYL, whose tea and cakes may have been an offering of gratitude for the removal of the obstruction to domestic traffic, congregated.

The cement mixer mixed cement, the boys heaved, pushed, pulled and swore, the XYL cheered and the tower was erected. Now, in place of a monster 42 ft. wide and 4 ft. high, was a landmark 42 ft. high and 4 ft. wide at the bottom, making a great difference in a backyard 45 ft. wide.

A catwalk was prefabricated from scrounged bedsteads and fitted near the top. The top bearing plate, six inches square by 1" thick, with convenient length of pipe welded through centre and iron legs 8 inches long of 1" x 1/2" welded to each corner at the correct angle, is bolted to the top of the tower legs.

The beams used are a two element "ZL Special" for 14 Mc., two element "ZL Special" for 21 Mc., and a 4 element parasitic for 50 Mc.

Four stays were attached to the 30 ft. level as a safety measure and so far the tower, 200 yards from and overlooking the ocean, has withstood gales of up to 80 m.p.h.

Further details of construction, etc., can be supplied on request to anyone interested in the erection of a similar structure.

If someone else builds it and then has a change of QTH, the writer would like to know how it was taken down. Hill

REMEMBRANCE DAY CONTEST

13th and 14th August

With the coming of August, members will recall that this month holds a date of particular significance to Australian Amateurs. Our Remembrance Day Contest is designed to honour the memory of our gallant comrades. By our participation, we render personal homage.

"At the going down of the sun
and in the morning,
We will remember them."

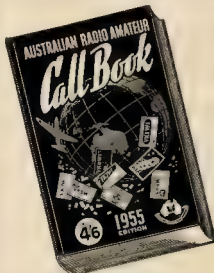
VARIATION OF AWARDS

The following variation of awards under Rule 17 will operate in the coming Remembrance Day Contest.

Instead of the three awards being given to first, second and third, in each State, these three awards will be given to the winners of the Phone, C.w. and Open Sections respectively.

It is felt that c.w. operators are at a disadvantage compared to those working phone or both phone and c.w. as they are so much in the minority and the change will encourage c.w. operators who would otherwise have little chance of gaining a certificate.

The full rules appeared in the July issue of "A.R."



The Australian Radio Amateur CALL BOOK

Available now from—
Divisions of W.I.A. and
Leading Booksellers in
each State.

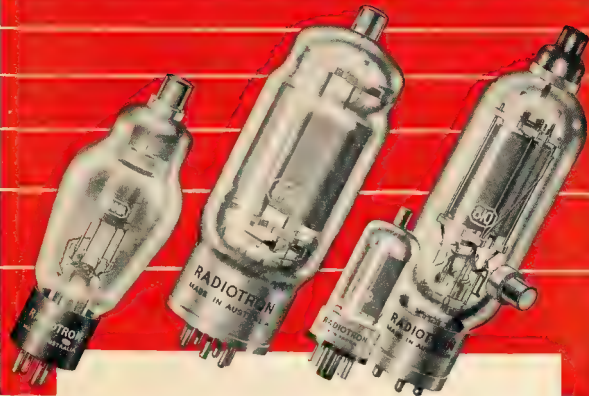
**ORDER YOUR
COPY NOW—4/6**

Postage 6d. extra

- An up-to-date listing of Station Call Signs and Addresses of Licensees of Transmitting Stations located in the Commonwealth of Australia and its Mandated Territories including the new Z Call Signs.
- Over one thousand additions, alterations and deletions of last edition.
- World-wide Awards available to Amateurs and Short Wave Listeners.
- Up-to-date list of Australian Broadcast Stations and their frequencies.
- Drilling information—all necessary data for drilling and tapping.

PUBLISHED BY THE WIRELESS INSTITUTE OF AUSTRALIA

RADIOTRON POWER VALVES



Today's high standards of radio performance are dependant upon the use of first quality components.

Radiotron valves are manufactured to exacting standards which ensure you of the ultimate in performance at all times.

Be sure of the quality and consistency of your signals by using Radiotron Power Valves.

Important: When ordering valves, be sure to mention "Amateur Radio" so that priority can be given to your order.



RADIOTRON

AMALGAMATED WIRELESS VALVE CO. PTY. LTD.

"HAM" RADIO SUPPLIERS

(KEN MILLBOURN, PROP.)

ANNOUNCE THEIR STOCKTAKING SALE

Bargains Galore - - Compare These Reduced Prices

NOTE THESE VALVE PRICES LARGE STOCK OF CRYSTALS

Look at these Bargain Priced NEW VALVES—

| | | | | | | | |
|------|------|--------|------|---------|------|-------|------|
| 1A5 | 2/6 | 6N7 | 10/- | 128J7 | 10/- | VR21 | 2/6 |
| 1B5 | 2/6 | 6N8 | 15/- | 128K7 | 10/- | VR22 | 2/6 |
| 1K4 | 5/- | 6Q7G | 5/- | 128Q7 | 2/6 | VR32 | 2/6 |
| 3Q5 | 5/- | 6R7G | 10/- | 128Q7GT | 2/6 | VR35 | 2/6 |
| 5V4 | 10/- | 6R7G | 10/- | 816 | 15/- | VR38 | 2/6 |
| 6AG7 | 15/- | 6RC7 | 10/- | 880 | £1 | VR66 | 2/6 |
| 6B8 | 15/- | 6SJ7GT | 12/6 | 834 | £1 | VR75 | 15/- |
| 6C8 | 7/6 | 6SK7GT | 12/6 | 854 | 10/- | VR99 | 5/- |
| 6F5 | 7/6 | 6S87 | 13/6 | 885 | 10/- | VR102 | 5/- |
| 6F6 | 10/- | 7A4 | 5/- | 957 | 10/- | VR103 | 5/- |
| 6K6 | 7/6 | 7A6 | 5/- | 1635 | £1 | VR105 | 15/- |
| 6K7 | 10/- | 7B8 | 5/- | 5753 | 25/- | VR122 | 2/6 |
| 6K7G | 7/6 | 7C7 | 2/6 | EF50 | 10/- | VR150 | 15/- |
| 6L7 | 10/- | 7E6 | 5/- | U10 | 2/6 | VT30 | 2/6 |
| 6L7G | 7/6 | 7W7 | 5/- | VR18 | 2/6 | VT51 | 2/6 |
| | | | | VR19 | 2/6 | VT52 | 10/- |

Full stocks of New Valves available. Prices on request.

Following list are ex Disposals, guaranteed—

| | | | | | | | |
|-----|------|------|------|-------|------|------|------|
| 1K5 | 5/- | 5U4 | 12/6 | 4J5GT | 10/- | 4V6 | 10/- |
| 1K7 | 5/- | 6AC7 | 10/- | 6SA7 | 10/- | 12A6 | 10/- |
| 1L4 | 5/- | 6AG5 | 10/- | 6SJ7 | 10/- | 12K8 | 10/- |
| 1B5 | 10/- | 6C8 | 5/- | 6SK7G | 10/- | 1625 | 15/- |
| 2X2 | 10/- | 6D6 | 5/- | 6SL7 | 15/- | CV82 | 15/- |
| 3A4 | 5/- | 6H6 | 5/- | 6SN7 | 7/6 | EF50 | 5/- |

Bendix RA1B Power Supplies, 240 volt AC, 24v. at 1 amp. output 250v. HT .. £5 each

Genemotor Power Supply, SCR522, 24v. input, 150v. and 300v. output at 300 Ma. Includes relay, voltage regulator, etc. A gift at £1. Too heavy for postage.

2.5v. or 4v. Filament Transformers .. 15/- each

Chokes, 15 Henry, 100 Ma. .. 10/- each

Chokes, 15 Henry 175 Ma. .. 20/- each

2 uF. 1000v. block type Chanex Condensers .. 12/6

Relays, A.W.A. Aerial Change-over type, 12v. .. 15/-

English Carbon Mike Transformers, new .. 5/-

Loektal Sockets .. 1/6 each

Valve Sockets, ceramic, 8-pin Octal .. 2/6

100 Kc. R.C.A. Crystals .. £4

1000 Kc. Crystals, DC11 holder, with two pig-tail connect., 35/- Gold Plated Marker and Commercial Crystals, price on request. Delivery in seven days.

Following is a list of Crystal Frequencies available for immediate delivery. £2 each—

| | | | | |
|------------|--------------|-------------|--------------|--------------|
| 2001.2 Kc. | 5456 Kc. | 7024 Kc. | 7120 Kc. | 8161.538 Kc. |
| 2103.1 Kc. | 5530 Kc. | 7025 Kc. | 7121 Kc. | 8171.25 Kc. |
| 2112.5 Kc. | 5740 Kc. | 7028 Kc. | 7125 Kc. | 8176.923 Kc. |
| 2208.1 Kc. | 5822.5 Kc. | 7032.6 Kc. | 7126 Kc. | 8182.5 Kc. |
| 2218.7 Kc. | 6350 Kc. | 7035 Kc. | 7130 Kc. | 8183.5 Kc. |
| 2585 Kc. | 6375 Kc. | 7040 Kc. | 7134 Kc. | 8185.889 Kc. |
| 3062.5 Kc. | 6450 Kc. | 7042.65 Kc. | 7140 Kc. | 8317.2 Kc. |
| 3086.5 Kc. | 6850 Kc. | 7050 Kc. | 7145 Kc. | 8320 Kc. |
| 3382.5 Kc. | 7045 Kc. | 7053.5 Kc. | 7150 Kc. | 8125 Kc. |
| 3500 Kc. | 7010 Kc. | 7064 Kc. | 7156 Kc. | 10 Mc. |
| 3811.2 Kc. | 7010.7 Kc. | 7068 Kc. | 7162.5 Kc. | 10.511 Mc. |
| 3515 Kc. | 7011.5 Kc. | 7072 Kc. | 7163 Kc. | 10.515 Mc. |
| 3516 Kc. | 7011.75 Kc. | 7073.5 Kc. | 7174 Kc. | 10.524 Mc. |
| 3825 Kc. | 7012 Kc. | 7075 Kc. | 7175 Kc. | 10.530 Mc. |
| 5060 Kc. | 7016 Kc. | 7077 Kc. | 7225 Kc. | 10.5465 Mc. |
| 5050 Kc. | 7018 Kc. | 7080 Kc. | 8097.69 Kc. | 10.555 Mc. |
| 5300 Kc. | 7020 Kc. | 7100 Kc. | 8009 Kc. | 12.915 Mc. |
| 5335 Kc. | 7021 Kc. | 7106.7 Kc. | 8014 Kc. | 14.020 Mc. |
| 5360 Kc. | 7021.715 Kc. | 7110 Kc. | 8155.714 Kc. | 14.322 Mc. |

MORE BARGAINS ON INSIDE FRONT COVER!

Simulator Set. Contains two meters 0-20v. and 0-5 Ma., 2 in. square type. Two VR85, one VR135 valves, one vernier dial. Genemotor 11-12v. input, output 450v. at 40 Ma. (conservative rating) and lots of resistors, condensers, etc. £5 each

American Metering Kit containing one 0-10 Ma. and one 2 Ma. Meter, 2 inch round. Complete with cords and plugs, 22

Inter-Com. Units, English. Contains two valves, transformers, P.M.G. key switch, resistors, etc. To clear .. 12/6 each

Shielded Cable with two 12-pin Plugs .. 7/6

Five-core Cable, not shielded .. 8d. yard

Co-ax Connectors, Ampenol type, male and female .. 7/6 pair

Co-ax Connectors, male/female, small PI type, new, 2/6 pair

Co-ax, indoor type, cotton covered .. 1/- yard

Co-ax Cable, any length, 50 ohms .. 1/9 yard

5A MELVILLE STREET, HAWTHORN, VICTORIA

North Balwyn Tram Passes Corner, near Vogue Theatre.

Phone: WA 6495

Money Orders and Postal Notes payable North Hawthorn P.O. Packing Charge on all goods over 10 lbs. in weight, 5/- extra.

WANTED TO BUY—RADIO PARTS, VALVES, TRANSFORMERS, RECEIVERS, TRANSMITTERS, ETC.

Amateur Radioteletype

67 West 44th Street,
New York 36, N.Y., U.S.A.

Editor "A.R."
Dear Sir,

FOR some years I have been diligently scrutinising the various Amateur Radio Journals of our overseas friends in the hope of some day finding that interest had been aroused in a form of Amateur Radio communication which has made considerable progress in the United States.

I am referring to Amateur Radioteletype operation; the use of mechanised telegraph printers to permit accurate and high-speed transmission of messages in the manner so nearly universally employed by the commercial radio companies.

Here in the U.S.A. the radio-printer group has grown from a single station in 1946 to well over 2,300 at the end of 1954. In addition, there are about 50 Canadian stations now transmitting via this means. A very few overseas stations have participated which means that little or no DX operation is occurring outside of continental North America. This is to be regretted inasmuch as Amateurs have always prided themselves on their ability to keep abreast of, if not outstrip, their commercial brothers.

R.t.t.y. offers real benefits to the Radio Amateur. In the emergencies wherein Radio Amateurs the world over have so often contributed to the security of life and property, teleprinter operation enables an extremely large volume of message traffic to be handled in a minimum of time, with a maximum of accuracy, and by relatively unskilled operators.

Since most wire-line communication companies and agencies have converted almost exclusively from Morse hand-keyed transmission to code-operated printing telegraph equipment, it will be realised with what effectiveness an r.t.t.y. Amateur could provide a radio link for an emergency-breached wire line circuit.

I have had the good fortune of being the first Amateur to use radioteletype-writers via f.s.k. (frequency-shift-keying) on our bands. I was very shortly joined by several score of New York City Amateurs on the 2 mhz v.h.f. band. Very shortly thereafter Amateurs pioneered the first transcontinental U.S.A. printing telegraph hook-up. Following that was the setting up of a circuit to Japan for the handling of free messages from the American soldiers stationed there to their families in the States.

After considerable campaigning Governmental regulations were altered to permit r.t.t.y. on all bands, hitherto only available to cw-keyed circuits. This relaxation of restrictions against the employment of f.s.k. on the DX bands is what prompted the writing of this letter. Similar action on the part of overseas governments would make International radioteletype communication a common occurrence.

Co-operation is had with our Civil Defence, Red Cross, Telegraph Companies and the Signal Divisions of our Military Forces for participation with them in the event of a National Emergency. The Army, Air Force and Navy have

provided radioteletype in the stations they permit to be operated, on Amateur bands, by Amateurs among their members.

Since 1946 the r.t.t.y. Amateurs throughout the U.S.A. and Canada have had as their National organisation the V.h.f. Teletype Society with headquarters at 38-06 61st Street, Woodside 77, N.Y., U.S.A. Despite the name, the Society is not restricted to v.h.f. but is the headquarters organisation for all r.t.t.y. Amateurs. The Society furnishes constructional blueprints, technical bulletin, maintains departments for aiding new members and publishes a National publication.

The most important service performed by the Society is the obtaining of very serviceable, although superseded, printing telegraph equipment for its members through contacts with all the major wire companies. This equipment, which now would cost over \$1,000 in most cases, is available to the Society's members for about the cost of bookkeeping to the telegraph companies. Equipment is secured as inexpensively as \$15 and not over about \$100 as a maximum. Originally many new machines were obtained from Military surplus disposals although this source has practically disappeared at the present time.

It should be mentioned at this point that advantage is taken of the unique ability of f.s.k. receiving converters to eliminate or minimise radio noise, fading and QRM, to set up automatic "repeater" networks (most have been on v.h.f.). A repeater picks up an incoming signal, "washes" out the QRN, QRM, QSB, etc., and operates a polarised telegraph relay. The contacts of this relay now provides an "ideal" signal, not only for keying the local teleprinter, but for keying a "brand-new" outgoing f.s.k. signal.

Copy is faultless and errorless on signals so weak and full of noise that, were it hand-keyed, using make-break c.w. instead of f.s.k., copy would be impossible. F.s.k. is startling in this respect. Frequency shift has the added advantage that, like f.m., interference with television and radio is minimised or eliminated since the carrier amplitude is unchanging. Key clicks are non-existent.

Most attempts to get overseas Amateurs interested in r.t.t.y. have met with the stumbling block of the availability of equipment. While it is possible that the V.h.f. Teletype Society could arrange to set equipment shipped to foreign points, it would appear much better to attempt to tap sources of equipment closer to home. Communications agencies and companies, if properly approached, are generally pleased to have an outlet for their superseded machines at prices above that for scrap metal, when they have assurances that the equipment will not be utilised in competitive services.

Individuals stand little chance of obtaining the release of this sort of apparatus, but they will generally co-operate with duly authorised representatives of a National group. One of their objections to dealing with individuals is the large volume of correspondence involved in individual, piecemeal, sales. A National group can handle the

release of hundreds of machines with a single letter.

Surplus Military disposals may be a good source in which to secure printers.

In closing this lengthy, but earnest, communication, I would like to offer my assistance to any overseas Amateur having bona-fide interest in printing telegraph operation. I have been the Secretary of the V.h.f. Teletype Society National organisation for the past eight years and have seen it grow up to several thousand enthusiastic members through the spirit of co-operation that exists all over the world among Amateurs. It is my sincere hope that International r.t.t.y. operation will become as much a reality as our extensive operations in this country.

Fraternally,

JOHN EVANS WILLIAMS, W2BFD,
Technical Editor "CQ"



SERVICEMEN AND TECHNICIANS

- To meet expanding field, GLORAD requires Servicemen and Technicians with genuine ability.
- GLORAD manufactures and services a wide range of Industrial Electronic Equipment.

Write—

GLORAD
ENGINEERING SERVICES

291a TOORONGA RD., S.E.6

MALVERN, VICTORIA

Phone: BY 2774

for Appointment

USE OUR FAST MAIL ORDER SERVICE

What we have not got in stock, we will gladly get for you if possible. Please write re your needs!

BROWN'S HEADPHONES

For Trouble Free Reception

TYPE X—Magnetic **55/6**

TYPE A—Adjustable Reed Type
. **£8/15/-**

TYPE K—Hi-Fi Moving Coil type for Broadcast Station Monitoring, Recording, Short Wave Listening and all professional uses, **£11/12/-**

TYPE F—Light-weight, sensitive type incorporating powerful cobalt steel magnets and flat stalloid diaphragms. Constructed for rough usage **£3/17/6**

Types A and K available shortly.

HEADPHONE CORDS

SPARE HEADPHONE CORDS, well finished with cable ties and loops. High quality fabric covered tinsel cable.

4 foot cables **5/-**
6 foot cables **7/6**

Prices include Sales Tax.

Leading Australian Amateur
Phone Stations Acclaim—

WODEN

Multimatch Modulation
Transformers

| List No. | Audio Watts | R.F. In. Watts | Max. Sec. Current | Weight lbs. ozs. |
|----------|-------------|----------------|-------------------|------------------|
| UM1 | 30 | 90 | 120 Ma. | 6 8 |
| UM2 | 60 | 180 | 240 Ma. | 11 8 |
| UM3 | 120 | 360 | 480 Ma. | 14 8 |

Write for details of Wide Impedance Matching Range

UM1 3½" x 3½" x 3½" **£6/9/11**

UM2 5½" x 4½" x 5½" **£9/17/6**

UM3 5½" x 5½" x 5½" **£12/3/6**

Prices include Sales Tax. Freight and Packing Extra.

PHILIPS 6146

BEAM POWER AMPLIFIER VALVES

available from stock

£3/10/-

Ideal for use with
"Geloso" VFO Unit

C.W.—0.3w. drive for 69w. out!

Phone—0.3w. drive for 52w. out!

FILTER CHOKES

TYPE Z956-1—Inductance 30 Hen. max., 20 Hen. min. at full rated DC of 200 Ma. DC resistance 160 ohms, DC working voltage 1,000 volts. **£3 plus Sales Tax.**

TYPE Z969-1—Inductance 25 Hen. max., 15 Hen. min. at full rated DC of 80 Ma. DC resistance 500 ohms, DC working voltage 1,000 volts. **35/- plus Sales Tax.**

TYPE Z986-1—Inductance 15 Hen. max., 10 Hen. min. at full rated DC of 300 Ma. DC resistance 60 ohms, DC working voltage 1,000 volts. Ideal for low loss filter in mercury vapour or high vacuum rectifier full wave power supply **£3/10/- plus Sales Tax.**

OUTPUT TRANSFORMERS

TYPE OT-790—Primary Z, 12,000 ohms tapped 8,000 ohms, Secondary Z: 500 ohm line. Handle 14 watts audio conservatively. Suit PP 6V6s Class AB1. Ideal for remote Modulator for low power modulation, low power Public Address Amplifier, etc. **59/6 plus Sales Tax.**

TYPE OT-796-1—Primary Z: 6,600 ohms CT, tapped at 3,800 ohms; Secondary Z: 250, 167, 125, 100 ohms. Match PP 807 Class AB1 to low Z line. Ideal for Modulator use up to 18 watts conservatively rated. **80/- plus Sales Tax.**

TYPE OT-797-1—Primary Z, 3,800 ohms CT, tapped at 3,200 ohms; Secondary Z: 250, 167, 125, 100, 83 ohms. Match PP 807s Class AB2 to low Z line. Rated for 55 watts. Ideal for Modulator Transformer. **£5 plus Sales Tax.**

CONDENSERS

A.W.A. Type "H" Two Gang Variable. .15/- plus Sales Tax.

DIODES

Type OA50 and Type OA56. These diodes have similar characteristics to the 1N34A. **8/6 plus Sales Tax.**

"SMITH" ELECTRIC PRE-SET CLOCK

For suitable circuitry, read the July issue of "RADIO & HOBBIES" describing a "Clock Radio."

Can also be used for delayed operation of Amateur equipment, alarm system or any electric switching function.

HAS THESE FEATURES:

- Controls functions of the unit when set to alarm position, controlled unit being switched on at pre-set time as indicated on "Alarm Disc." In the off position only the clock functions, and in the manual position both the controlled unit and the clock are on but operating independently.
- Incorporates an "alarm" switch with a push-pull action. The pull-out position permits operation of the Alarm Disc which sets the time the alarm will operate. Pushed in, the switch cuts the alarm off.
- A "SLEEP SWITCH" automatically switches off the controlled unit at any desired time up to one hour after setting. In the case of a radio, this would be switched off any time up to an hour, even if you have gone to sleep.
- An ALARM DISC rotates when the alarm switch is turned in an anti-clockwise direction and is pre-set to time as indicated by a small pointer on the rear of hour hand of clock.
- 240 volt AC operated incorporating famous Smith "SECTRIC" clock movement.

Price complete with control knobs and operating instructions. Inc. Sales Tax

£5/19/6

"SMITH" "WORLD CLOCK"

Tells the time anywhere in the world. **£3 inc. Sales Tax**

Established over
90 years.

WILLIAM WILLIS & CO. PTY. LTD.

Phone: MU 2426

423 BOURKE STREET — — MELBOURNE, C.1

NEW SOUTH WALES

On Sunday evening, 11th June, at 7.30 p.m., the usual v.h.f. broadcast was given by 30A, and the conclusion he announced that a Surprise Scramble was to be held at 8 p.m. from the time the announcement finished until 8 p.m. The Scramble was on and at 8 o'clock 25 stations were reported as having taken part. The honours went to John 2ANF who made 23 contacts, Adrian RHE was second with 19 contacts, and 3CE, 2AJZ and 5VM shared third place, 18 contacts. The results and the idea were heartily commended by all.

The Grouse had planned a Fox Hunt for Sunday, 18th June, and although the day was not started or finished as planned, the Fox Hunt was still a success. The fox was shot by 2AMP and 2AJZ was to have been the fox, but owing to a break-down, he was unable to go on the air at the time scheduled. He made his first appearance at 6.00 pm, having already informed the hounds what had happened. After a conference the hunt was recognised with 2AMP being the fox and 2AJZ the hounds. It was on his way and the hounds were soon in full chase, but was not caught until he had gone some distance from the house. As the winning the chase were allotted for miles covered and for time taken, so, as 2HIL was first in, and 2OJA covered the shortest distance, the latter was awarded the prize. 2HIL decided the best thing to do was to hold a short run so as the two super snipers could settle down to their work. This was done, but very short but sharp run the fox was caught, and would you believe it, that the winner was 2ILO who was second both up! Unfortunately the feud continues.

The V.H.F. Sunday Broadcast is now being done on a roster system and the stations in order are: 2HO, 2APQ, 2AJZ, 3OA, 2HL and 2QZ. We hope that there will be no split infinities.

The month's meeting of the Group took place on the first Friday of the month at the usual meeting place, the Leuchardt-Peterham Technical College. The business of the evening was quickly dealt with, after which our lecturer, Norm Beard, JALJ, of the staff of the College, could continue his lecture of the previous month on the television set. He showed a slide of a television set of a commercial t.v. set. The rx was on display with a pattern generator also a signal generator with which to cause interference. The picture was good. The picture was made up of 50 percent counts, the number of tubes in the rx with misaligning—22 plus the picture tube. At the conclusion of the lecture a vote of thanks was passed and the evening was passed with acclamation. During the evening, Adrian informed the Group as to the action and the results obtained so far in the investigation of the electrical system of N.S.W. In a distance contact records.

The management committee of the Group met at the home of IAP's on 5th July and apart from the business dealt with, a supper of 17 mean proportion, prepared by Mrs. and Miss Healey, was also very successfully dealt with. During the evening the committee arranged the following fixtures: 7th August—Field day, the actual form of which will be advised later. On 21st August a male scramble will be held between the hours of 8 and 10 p.m., and on the 31st August a night Hidden X Hunt. Other subjects were discussed and will be reported at the next meeting of the Group on Friday.

VICTORIA

At the last Fox Hunt it was the hounds who played the tricks. While SIE kept the fox crew entertained with light conversation, JYV and Jim Shaw put identifying "L" for Len marks on the foxes' backs. The foxes were marked with red bars and fluorescent paint on the sides of the fox car. At the first hiding place in a sports oval in Hawthorn, the first to frisk the Fox was JYV, followed by SIE, then JZM, JZL, JZAA and JYB. Then around the streets in Glen Iris JZAM, JYV, JKD and JALY all caught the Fox while he was on the run. The next spot was in the back of the Glen Iris Sports Oval where JADU was first followed by JKD, JZAY, JALY and JZAM. After leaving this spot the Fox was again run down whilst on the run by JYV, JZAM, JZL, JZAA and JZM. The final location was held at the home of Clem JOY at Burwood. Thirty three participated in supper and the post-mortem on the evening's hunt. The JOY family was most generous and friendly hospitality in making their home available for the gang to finish off the evening. Bob JOY acted as control station and was ably assisted by JZM, JZL and JZAA with cross bearings. Many thanks Bob and Ren.

We hope to have two new starters at the next Fox Hunt in Tem 3AGC and Roy JARY. Tom's rig has two 12AT7s, a 6J5 final, modulated by a 6C4 and a 6AQ5, intends building a xtal locked converter into his car radio with a 6 el. beam attached to his car. Roy JARY has a xtal locked converter into a Command rx and a three el. beam. Berry JAPB is building a new 2 max mobile-12AT7, 57B3 and 2Z3, also a new beam into the home location, a 5 over 3, approx. 15. feet.

At the Vhf meeting, Max 3ZAW gave an interesting description of his 1 m μ gear which he had brought along. It consisted of a converter placed in the genemose space behind the 5 to 9 Mc. Commamixer. Alf DLE, who had an interesting set of figures and tables which he had compiled, it almost proved that within the metropolitan area, DX working ability was directly proportional to the elevation of the station.

Considerable time was spent in discussing the V.h.f. Group's exhibit at the forthcoming Models Exhibition and Bob JOY was appointed to act on the main committee for the V.h.f. Group.

Laurie 3ALY has recently moved indoors to a new shack. The tx is a 636 axial controlled and tripler to 28 Mc. 636 doubler and tripler, QW47 driving an 833, his beam is a 5 over a 5 and 1/2 inch tube. He has a crash pull converter into another 3-tube converter on Mc. then into a BC433G at 1,500 Kc.

Max 3BQ has made contact with 2AJO at Coolamon on phone and has worked Bram 3ZAB at Naracorte since the erection of Bram's new 30 el. 2 mx beam. 100 ft. high. 3JX of Hamilton, has worked 3PG cross-band 80 mx, hopes to have 2 mx converter going soon. STA, at Horsham, reports hearing a number of Melbourne stations on 2 mx; tx will be in operation shortly.

Don't forget to look for the chaps in Gippsland, active at present are 3ZD at Warragul, 3YS at Yinnar, 3YO at Yallourn and 3DI at Leonatha. A new one in Gippsland is 3ZAN at Warragul with a 3000 Hz tone at 14.14 Mc. 1AKR is active on 3 m and 3XJ at Geelong. 3ZAZ at Glenelg-Thompson is operating on 144.46 Mc and using 8w. into a dipole, has worked 1AKR and 3AGD and is frequently on the band. 3ZBH, 3ZBH, Glen 3ZBJ, is now active on the 3 m band.

3ZBH and 3AHL have their gear ready to operate on 288 Mc. They will be on the air each evening from 1930 hours and will make

50 Mc. news. Who requires Northern Territory for 6 mx W.A.S.T. STL, of Alice Springs, is building gear for 6 mx and hopes to be on by the time it opens up again.—SLN

SOUTH AUSTRALIA

50 Mc.: There is very little activity on this band, the only station to be heard are Kex 5KC, Col 5FO and our scribe. The future of 50 Mc and later 50 Mc is very uncertain, the proposed change from 50 to 60 Mc. and secondly, t.v.l. being the main deterrent to any activity. This band is very prone to t.v.l. as many Ws have found out. However, one compensating factor is that during the summer months we will be able to watch the Interstate television, i.e. if the transmissions are around the 50 Mc band.

144 Mc.; This band is undoubtedly "the whif. bend." The possibilities for experimenting and long distance ground wave communication are very great, there being much to do that hasn't been done before in the way of rx and antenna design. Stations operating on this band are 5AV, 5HD (Bill does not get on very much these days due to pressure of work), Ian 5ZAA, Neil 5ZAW with a much improved signal, Ned had a very unusual fault in his tx-to-much grid drive of all things! Others operating include SRO, SKC, SLE and SRI

Last month your scribe journeyed by car to Whyaalla and Fort Lincoln complete with 2 inx converter and 3 el. Yagi beam. At a pre-arranged time sigs were heard from Col SFO, using 10w input to a 322 and 3 el. beam. His sigs were R3S3 with signal strength peaking at 5. The time of use was 10:00. The next day a solid R3. Signals were also heard from BMT's to using 100w input and a 12 el beam. Signal level at Whyaalla varied from 5.6-8.0 on peaks, the distance being approx 130 miles.

On 19th of last month your scribe changed NBT numbers on 144 Mc with Trev SATN in Warracknabeal sigs both ways 53-55 with the usual QSB. On the same night your scribe also copied Ray SATN, but his signal was well down below Trev's in level. At 3150 hours SAST the same night, Trev copied SMT's phone on 144 Mc. for a period of 3 minutes. The following night, Monday, 20th, SMT's scribe was again heard by Ray and Trev, how-

VIEW

NEW ZEALAND AMATEUR
CALL BOOK

Published by N.Z. Association of
Radio Transmitters.

The book contains a complete list of all New Zealand Amateur Stations and also lists overseas members and non-transmitting members. Further sections include Hints on Operating Procedure, Amateur Frequency Allocations, W.V.V. Schedule, N.Z.A.R.T. Standard Frequency Transmissions, Official DX C.C. Countries List, Country Prefixes and a list of N.Z.A.R.T. Contests and Overseas Awards not all of which are given in detail, it being necessary to refer to various issues of "Break In" for full particulars.

Copies are obtainable from the New Zealand Association of Radio Transmitters, Box 970, Dunedin, N.Z., and the price is 2/6 (New Zealand) plus 2d. (N.Z.) postage, approximately 3/4 Australian.

ever they were much weaker than the previous night. No more tests took place until Sunday, 27th, and once again Trev identified my 2 mx sigs, but they were extremely weak. It does appear from the above results that a signal can be heard just about every try over this difficult 270 odd mile path. —SMT.

WESTERN AUSTRALIA

Despite lack of publicity, the attendance at the newly formed V.h.f. Group has steadily risen and about 20 people attended the June meeting held at Rollo's home. Welcome visitors were Bill 6DX from Kalsgrove and Don 6DW from Bruce Rock. Sid 5JZ was our lecturer and gave a very interesting talk on transistors and a germanium transistor set built by him. A slip of the tongue around the time of the presentation of the set to the group was "this is a very good set" which is very embarrassing to the speaker. D.M.E. rx, 6AKS/818, 6AKS pentode, 6AKS mixer. The thanks of members goes to Rollo and Mrs 6BO for their hospitality.

144 Me.: Quite a co-operative effort is being made to increase the mobile activity on this band. Len SZAT is building a tx using a QCC04-15 tripler in the final, Don SZAK is building the rx and Ron SZAR is providing the antenna and the car. Just whose call sign will you use boys?

The distances, being worked in the Eastern States should provide food for thought for any country Amateur who is thinking of coming on 2 mhz. The present lack of any active country stations is not encouraging for anyone to improve their gear. Any country Amateur who would like information and even a portable expedition to his QTH should contact any of the v.h.f. gang in Perth!

Hollo 680 has just completed his receiving station for Adelaide air radio on 133 Mc approx. When he hears Adelaide then 3 mhz may be open! Don't scoff! He has worked into Adelaide on two occasions!

The V.h.f. Scramble will have taken place when this appears in print and I wonder how many people will be building more selective rx's. Jim SRU, always a contest man, has already sharpened up his SSB in preparation!

908 Me.: This is the band of activity. ZSAV's new converter mentioned in last month's notes has been working very well and Don has now commenced a xtal controlled tx using 332s as a tripler from 908 Mc. and as a final. Don was able to provide Sten ZSAV with his first contact on this band. Sten ZSAV is now using a 332s as a tripler. Don's 332s is now using 3w. and was able to work Don ZSAV 7ests with Wally ZSAV were unsuccessful. The 6B0/ZSAV contact has still not taken place despite the addition of a ground grid p.p. r.f. amplifier to the latter's ground.

6ZAA is building a xtal controlled tx using 12AT7s for mobile use and this should create additional interest. Murray 6ZAM, Lionel 6ZAE and Cecil 6ZAZ, who have promised activity on 288 Mc., have still to appear. Lionel and Murray, at the top of the Darling Scarp (1,600 ft. and overlooking Perth), should work some fine distances!—6ZAA.

AMATEUR CALL SIGNS

FOR MONTH OF MAY, 1955

NEW CALL SIGNS

VK— New South Wales
 2FG—J. H. Gore, 12 Pearl St., Newtown.
 2FY—K. A. Kimberley, 214 Wardell Rd., Dulwich Hill.
 2AOP—E. Pearce, 18 Meehan Gardens, Narrabundah, Canberra, A.C.T.
 2ATR—D. S. Robertson, 29 Carrington St., Deakin, Canberra, A.C.T.
 2AUD—K. E. McDonald, 5 Lombard St., Balgowlah.
 22BG—R. S. Graham, 764 Canterbury Rd., Belmore, Sydney

Victoria
 3FL—G. L. F. Smith, 43 Alexandra St., Montmorency.
 3MT—Royal Melbourne Technical College, 134 Latrobe St., Melbourne.
 3OH—A. Hoid, 10 Flinders Ave., Yoroak.
 3AAR—L. H. Ross, Hughes St., Upwey.
 3AYC—F. Clark, 164 Middleborough Rd., Blackburn.
 3ANK—N. A. Towns, "Weald Cottage," Leith Rd., Montrose.
 3AKW—V. C. Wirth, 28 Queen St., Cobram.
 3ZAT—D. D. Tanner, C/o. A. J. Savage, Scoresby Rd., Bayswater.
 3ZBI—J. R. Woodman, 24 Fewster Rd., Hampton, S.T.
 3ZBQ—B. W. Hainze, Liverpool Rd., Kilgith.

Queensland
 4CY—H. R. Greber, Station: 6 Miles N.N.W. of Yeppoon, Postal: P.O. Box Yeppoon.
 4IA—B. F. Darragh, Willis Island.
 4ZAW—G. Whitehead, 4 Biarra St., Yeerongpilly, Brisbane.

South Australia
 5DV—D. E. Vaughan, 148 Burbridge Rd., Brooklyn Park.
 5TM—R. D. Martin, House 29, Radium Hill.
 5TB—Metro Radio Club, Simpson's Buildings, Gawler Place.
 5ZAJ—J. A. Gibbs, 308 Hutt St., Adelaide.

Tasmania

7XD—K. W. Nutt, Station: Roseville Guest House, 11 Bedford St., New Town, Hobart; Postal: C/o. Hydro Electric Commission, P.O. Box 418, Hobart.
 7ZAT—K. A. Thomson, 126 Bowen Rd., Lutana, Hobart.

CHANGES OF ADDRESS

VK— New South Wales
 1BW—Waverley Radio Club, 47 Maymott St., SCOTCHBURY.
 1DM—D. W. McDonald, 5 Union St., Newcastle.
 1EA—L. Martin, 104 Doble St., Grafton.
 21Y—T. H. Cahill, 11 Cressden St., Railwaytown, Broken Hill.
 21H—J. V. Hutchison, 17 Lambert Rd., Bardwell Park.
 21K—M. P. Moore, 35 Towner Gardens, Page-wood.
 21K—B. T. Turner, 46 Hassell St., Westmead.
 20N—R. L. Douglas (Dr.), 5 Mason's Pde., Gosford.
 2SQ—W. J. Weller, 56 Buckingham St., Canby Vale.
 2WQ—R. T. Wilkins, 11 Thomas St., S. Grafton.
 2AEQ—N. S. King, 43 Bent St., Nth. Sydney.
 2ARH—E. R. Howe, 13 Arana Rd., Mona Vale.
 2AYO—P. Gresser, Lot 30, Maxwell St., Balgownie.

Victoria
 3LU—M. Muller, St. Leonards Rd., Healesville.
 3MP—S. V. Hooken, 69 Mason St., Hawthorn, E.I.
 3OY—W. D. Bliffe, 35 Warrigal Rd., Oakleigh, S.E.II.
 3QM—B. J. Learmonth, C/o. Mrs. Hiacock, Frederick's Lane, Portland.
 3SN—G. P. Lee, Station: 138 Madden Ave., Mildura; Postal: Box 339, Mildura.
 3AAM—A. R. Sengotta, 18 Hawthorn Ave., Caulfield, S.E.I.
 3AFF—L. B. Fisher, 11 Erskine Ave., Cheltenham, S.E.I.
 3AGE—M. G. Eam, 7 Nankivell St., Colac.
 3ALJ—G. L. Moore, 3 Wheatland Rd., Melburn.
 3AMO—M. S. Lang, 69 Bayview Cres., Black Hills.
 1AWQ—W. Kelly, 39 White St., Wangeratta.
Queensland
 4GD—L. H. Dodds, 34 Townsville St., West End, Townsville.
 4GL—J. F. Langford, Gundiah, N.C. Line.

BOSS HULL V.H.F. CONTEST

Owing to an oversight, VK5JO was omitted from the list of VK5s in the official results published last month. Herewith are the South Australian scores

| | |
|-------|-----------|
| VK5MK | 1620 Pts. |
| VK5QR | 1205 Pts. |
| VK5JO | 729 Pts. |
| VK5AX | 307 Pts. |
| VK5ZL | 284 Pts. |

4LM—L. E. H. Mallinson, 14 Hill St., Valley, Brisbane.
 4RJ—R. J. Delbridge (Rev.), 18 Grove St., Toowoomba, Brisbane.

South Australia
 5DZ—J. A. Casey, C/o. Station 5CK, Crystal Brook.
 5FN—R. J. Poole, 37 Stanley Ave., Blair Athol, Prospect.

Tasmania
 TAB—D. H. Fisher, 17 Pickard St., Lenah Valley, Hobart.
 7RY—F. E. Nicholls, 22 Haig St., New Town, N.G.

Terrestrial

5KB—K. S. Mullan, C/o. Crowley Airways, Lee, N.G.

CANCELLED CALL SIGNS

VK—
 2ND—K. W. Nutt, Now VK7XD.
 2AXZ—K. A. Kimberley, Now VK4FY.
 2ZAF—E. Pearce, Now VK4COP.
 3MT—Melbourne Technical College, Change of Name.
 3AQJ—K. E. McDonald, Now VK3AUD.
 3ZAT—F. Clark, Now VK3AFC.
 3ZAT—N. A. Towns, Now VK3ANK.
 3FL—R. C. Harris.
 3HO—C. L. R. Lock.
 3TS—Dept. of Civil Aviation, Change of Name.
 3KO—A. W. Kelly.
 3ZAM—R. D. Martin, Now VK3TM.
 7MR—D. M. Richardson.
 1PG—J. H. Gore, Now VK4PG.
 * See New Call Signs.

PLATED CRYSTALS

offered by

BRIGHT STAR RADIO

46 EASTGATE ST., OAKLEIGH, S.E.12 UM 3387

LATEST MODERN EQUIPMENT

AMATEURS! BRIGHT STAR PLATED CRYSTALS WILL GIVE YOU GREATER ACTIVITY.

PRICES FROM £5/12/6.

COMMERCIAL PRICES ON APPLICATION.

BRIGHT STAR CRYSTALS may be obtained from the following Interstate firms: Messrs. A. E. Harrold, 123 Charlotte St., Brisbane; Gerard & Goodman Ltd., 192-195 Rundle St., Adelaide; A. G. Healing Ltd., 151 Pirie St., Adelaide; Atkins (W.A.) Ltd., 894 Hay St., Perth; Lawrence & Hanson Electrical Pty. Ltd., 120 Collins St., Hobart; Collins Radio, 409 Lonsdale St., Melbourne; Prices Radio, 5-6 Angel Place, Sydney.



DOES YOUR WILLIAMSON ANNOY YOUR DOG?

IS YOUR CLASS B AMPLIFIER LINEAR?
ARE YOUR 'SCOPE AMPLIFIERS FLAT?
DOES YOUR VENTED ENCLOSURE BOOM?
EVEN YOUR BEST FRIENDS WON'T TELL YOU.
PLAY IT SAFE. GET THE FACTS ON YOUR SET-UP.

BUY AN ELECTRONIC PRODUCTS AUDIO OSCILLATOR KITSET!



20 CYCLES—20 Kc.
SINE WAVE
10 V. OUTPUT
1% DISTORTION

SQUARE WAVE
40 V. OUTPUT
2 MICROSEC. RISE

600 OHM OUTPUT

HI-STABILITY
RESISTORS

CALIBRATED
OUTPUT

AT £19/19/-, PLUS A FEW SHILLINGS POSTAGE, IT'S A STEAL!

Not only will you have a worthwhile instrument—you'll have a whale of a lot of fun building it—and you can then thumb your nose at the critics.

To those die-hards who say "Who is this crowd; is their gear any good?" we say this:—

We're new to the manufacturing field, BUT we've studied your requirements. We're out to supply them direct to you at a price you can afford. Our customers will get plenty of good old-fashioned service—they help us to grow—we believe they are entitled to it. Our technical specifications are backed by a Money-Back Guarantee. We can do this with confidence. Our performance claims have been checked independently and found 100% reliable. Send orders or enquiries to:—

ELECTRONIC PRODUCTS

P.O. BOX 28, PUNCHBOWL, N.S.W.

FEDERAL, QSL, and DIVISIONAL NOTES

FEDERAL

FREQUENCY CHANGE

In view of the change from 50-54 Mc. to 56-60 Mc. (the first of the 1.7 bands at the beginning of 1959, it has been felt a period of time for adjustment would be very advantageous for operators as well as allowing an uninterrupted period for the Ross Bull Contest.

Following approaches to the Amateur Administration, permission has been granted by the Authorities for—

The 56-60 Mc. band to become available as from the 1st November, 1956, and operation to cease on the 50-54 Mc. frequency on 31st January, 1958.

This concession will allow Amateurs some chance of comparing the bands and yet maintain continuity of operation while signals can be heard.

FEDERAL COUNCILOR FOR VKS

Federal Executive notes with regret that Jim Corbin, VK3VC, is necessary to relinquish the post of Federal Councilor in VK3. In spite of his many and varied duties, Jim has had to give attention to the post of a Federal level and has kept executive posts with matters relating to the New South Wales Division.

The important post of Federal Councilor has been assumed by Bill Lewis, VK3VZ. Knowing Bill's enthusiasm and activities in the Institute, it can be said with confidence that, in him, VK3 has found a worthy successor.

RADIO CLUB BOLIVIANO

An applicant for membership of the I.A.R.U. is the Radio Club, Bolivia.

The Radio Club Boliviano is the national Amateur Society for that country. It has a total membership of 131, with 30 licensed. There is a total of 69 Amateur Stations in the country and the official address of the society is Plaza Venezuela No. 21, P.O.B. 3111, La Paz, Bolivia.

FED. CONTEST COMMITTEE

NOTES ON CONDUCT OF REMEMBRANCE DAY CONTEST, 1958

These notes and suggestions are published as an aid to the contestants and the checking committees and all entrants are requested to follow them as far as possible.

The rules for 1958 are unchanged, but a rule specifying calling and logging procedure for contestants using a station other than their own has been added. The calling procedure specified has the approval of the R.M.A. Dept. and should indicate to all stations that a different operator is on the job and that a further contact with that call sign is valid.

Interpretation of rules. The committee has authorized the following interpretation of specific rules for the purpose of checking logs.

Rule 14: Logs not received by the Contest Committee by the due date will be disallowed except those from VK3 posted before the due date and logs from VK1 transmitted by radio.

Rule 19: Scoring. Logs will be those having a minimum of five valid contacts according to rule 11, etc.

Rules 11 and 14: A valid contact will have the call sign and cipher sent by the station worked, completely entered. It will be assumed for checking purposes that the station sending the cipher will have been correctly recorded.

Rule 11: Logs with serial numbers commencing at over 100 or numbers not in sequence will be disallowed, except where it appears that a genuine error has been made in the sequence.

General: Where doubt exists, the contact will be allowed. All checking will be done in the spirit of the contest.

Opening: Checking last year showed that there were a considerable number of what appears to be clerical errors in the logs submitted. As an aid to reducing these errors, the following suggestions are made.

If you use a rough log for the contest, use sheets ruled up in a similar manner to the proper log, it is easier to transcribe if all columns are in the same order and if there are 30 lines to the page, omissions or duplications should be as far as possible.

Write legibly and ensure that the cipher you give is correctly recorded on your log. The figures you show as having given are used to check what the other fellow shows as having received.

Acknowledge cipher received and wait for an acknowledgment of cipher given, because if a cipher is missing from either log a complete exchange of numbers has not been made and both contestants lose that contact. Ensure that the band of operation is correctly recorded each time you change bands.

Logs. Where possible use the standard log sheet, if this is not possible, use quarter paper ruled in a similar manner to the standard log and with 30 lines.

Have 20 contacts on each sheet with the serial numbers in correct sequence. It is a distinct help in checking if it is known that contact No. 187 appears two-thirds the way down on the sixth sheet—all contacts for checking are located by the serial number sent.

Make your log legible, checking is done at night and after several hours "hard to read" letters and figures are hard to read. If typed use double spacing; if written use ink not pencil. Do not use faulty ball point pens. Do not submit a log with a lot of corrections and c.w.

Awards: Logs will be eligible for awards as follows: OPEN—Logs of contestants showing scoring contacts by both phone and c.w. PHONE—Logs of contestants showing scoring contacts by phone, c.w.—Logs of contestants showing scoring contacts by only c.w.

General. In the 1954 Contest, 19 logs were disallowed for breaches of rules 11, 18 and 19.

1. Ensure that your serial numbers are correct.
2. Ensure that your log is sent to year Divisional Secretary for membership certification in time to be forwarded to the committee before the due date.
3. If you are getting only the minimum number of contacts to qualify get two or three extra to ensure that you have five valid contacts.

Good hunting follows, and may the R.D. Contest 1959 be the best ever.

CALL SIGNS

Attention of members is again drawn to the habit of omitting the prefix "VK" when announcing call signs. This is particularly noticeable in the case of phone operation.

Such practice is not in accordance with International requirements and contravenes the Wireless Telegraphy Act. Operators should be careful that they use the full call sign allotted to the station concerned.

FEDERAL AWARDS

W.A.V.K.C.A.

One application received during the month from Mr. C. H. Jackson, 39 Thorn Ave., Palm City, California. Mr. Jackson gained the certificate under the call sign K1G07Y where he was active during 1954 on active duty with the U.S. Navy. His current call sign is W6GRG and he is now trying to earn another W.A.V.K.C.A. Award from his present location. Certificate number three is being issued to Mr. Jackson.

DIVISIONAL AWARDS

From correspondence received during the month I have gleaned information to the effect that there are what appears to be Divisional Awards in existence i.e. other than the Ross Bull, Contest Committee Awards, etc. Since questions are being asked and cards are coming to hand, it would be appreciated if Divisions would advise me of any awards in existence in their areas. Some of this nature will place me in the picture and I can then answer the queries which come to hand.

—Gordon Weynton, VK3XU, Manager.

VICTORIA

This month I've decided that there will be no notes in the usual sense of the word. Other interests kept me away from the June meeting, and as nobody supplied any pen on the meeting there was no one to write up. The VK3 and country areas will be covered in the usual manner. Anyhow, in my humble opinion, no one will be able to develop a note of the June and wipe away the tears shed by the VK3 scribe.

For this month I propose a new line of action. The Federal QSL Bureau, the Contest Committee and sundry other departments are getting space each month to report on their activities, but the Mag Committee never seems to get a say. Well, the VK3 Division supplies the manpower for this committee, so the VK3 notes space is, for this month, given free, gratis and for nought to them. Heaven help the compilation department if THESE notes are blue pencilled.

There should be no need to list the members of this committee as their names appear on page 1 for everybody to see, but the actual work they do may not be appreciated. One night each month, generally the coldest or wettest, the members of the committee are in the room to the mag. Anybody leaving the meeting before midnight is a piker, and runs the risk of being called a piker. The main thought behind all meetings is to give the readers of "A.R." as much as is humanly possible for their money without sending the magazine bankrupt. At the same time we have to endeavour to obtain the largest circulation possible and cater for all tastes, be they high, low, constructive or theory, s.w.f. or active Amateurs.

Your committee feels that more often than not, the balance of technical articles to notes and advertising has not been the best, but we have done so with our limited number of articles available. The remedy is in our readers' hands. We rely on them for material for the magazine. If you have an idea, or takes four or five months to see print that we have more than we can publish, if an article is straight forward, does not require any drawings, or only one or two that are small and simple, there is every chance of it being published within two months. If, on the other hand, a large number of drawings or a complex circuit diagram is required, the understaffed technical department, all of whom work in their own time and are forced to work the clock in an endeavour to make the deadline, must take longer to prepare your article for publication.

Talking of deadlines, there is a growing tendency for various scribes to be late with their material. The deadline is the 8th of each month, and unless this date is adhered to it is impossible to publish the type and the proofs checked, and the mag. out on time. The alternative—late notes not published. What can you do to help?

No doubt we ourselves are open to criticism, so let me have a say first. We have big plans to improve the magazine. We want to see more pages and a better class paper. Above all, we want to see more active Amateurs.

This programme is more ambitious than it looks in cold print, and will take quite some time to fulfill, but with your support we will do it.

We particularly appeal to the s.w.f.s for articles of interest to their groups—and we mean articles, not notes. We look to them to supply the Amateurs of the future, and in their ranks there must be many with the ability to describe equipment they have built which could have a wide appeal not only to their groups, but to active Amateurs as well.

I started out with the intention of outlining some of the activities of the Magazine Committee, but so far have only touched on a few points. We have a long way to go, and it should be aired publicly. Now space has caught up with me and the original intention will have to be shelved. I am sure you will be everlastingly of the Editor's committee and humbly asks that this matter be continued. In the meantime, if there is anybody with drawing ability please send in your drawings if only a few months, please come forward. The salary? Same as we pay SPS!

September Meeting—At the meeting to be held at the end of the month, an announcement will be made concerning the September meeting. The position is that the Radio Theatre will not be

"ACOS" CRYSTAL MICROPHONES and MICROPHONE INSERTS

A Complete Range For Every Purpose

DESK OR HAND MICROPHONE

MIC 36



£6/18/6

Housed in attractive plastic case, this Microphone is ideal for home recording and public address, etc. Response unexcelled for its size and price. The performance is not affected by vibration, shock or low frequency wind noise. Omni-directional frequency response substantially flat from 30 to 7000 c.p.s. Recommended load resistance not less than 1 megohm dependent on low frequency response. Can be supplied complete with switch and floor stand adaptor as required at a small extra cost.

HIGH QUALITY MICROPHONE

Designed to meet even the most exacting requirements, this Microphone incorporates the world famous floating crystal sound cell construction. Its special characteristics are that its fine performance is not affected by vibration or shock. The fidelity is not impaired by low frequency wind noise.

SPECIFICATION

Recommended load resistance—not less than 1 megohm.
Output level —55 db ref. 1 volt/dyne/cm².
Frequency response—substantially flat from 30 c.p.s. to 10,000 c.p.s.
Directivity—non-directional.
Size—2½" spherical diameter.
Connector—Standard international 3-pin.

MIC 16



£24/19/6

GENERAL PURPOSE MICROPHONE

MIC 35



£2/15/-

substantially flat response from 30 to 5000 c.p.s.

SPECIFICATION

Output level: —55 db ref. 1 volt/dyne/cm²
Cable—approx. 4 ft. of co-axial supplied.
Weight—6 ozs. unpacked, 7 ozs. packed.
Dimensions—microphone only 2½" x 2½" x ½"

TABLE AND STAND MICROPHONE

MIC 22



This omni-directional Microphone is robust in construction, with a pleasing appearance. Vibration, shock or low frequency wind noise will not affect the performance. The low frequency cut-off is dependent on the load resistance. The cut-off is given by the quotation, $F = 80 + R$, where F = c.p.s., R = megohms. An adaptor (floor mounting) is available at low extra cost.

SPECIFICATION

Output level = —50 db ref. 1 volt/dyne/cm².
Output impedance—equivalent to approximately 0.002 uF. (0.8 megohm at 100 cycles).
Frequency response—substantially flat from 40 to 6000 c.p.s.
Recommended load resistance—not less than 1 megohm, dependent on low frequency response.

LAPEL MICROPHONE

MIC 28



£5/19/6

Designed to give freedom of movement, this Microphone is small and non-directional. Housed in a soft moulded rubber case, which gives protection against shock, it is provided with a pin at the rear of the case for pinning to the lapel.

SPECIFICATION

Output level—approx. —55 db ref. 1 volt/dyne/cm².
Recommended load resistance—5 megohms.
Frequency response—level throughout the whole of the audible spectrum.
Capacity—0.0015 uF. at 1000 c.p.s.
Impedance—100,000 ohms at 1000 c.p.s.
Cord—6 ft. shielded cable.
Size—1-9/16" wide x 2¼" long x 1" thick.

HAND OR DESK MICROPHONE

MIC 33



£6/18/6

This Microphone has been designed for the high quality public address and home recording field. High sensitivity and flat characteristics are obtained by a specially designed acoustic filter. Housed in an attractive plastic case with an unexcelled response for its size and price. Unaffected by vibration, shock or low frequency wind noise. Omni-directional frequency response substantially flat from 30 to 7000 c.p.s.

MICROPHONE INSERTS



(MIC 32 illustrated)

CRYSTAL MICROPHONE INSERTS

These inserts are available in varying sizes ranging from as small as 15/16" square to 1-13/16" round, with various thicknesses from 7/32" to 9/16". Suitable for every purpose such as hearing aids, public address, tape recording, amateur broadcasting, etc., they have responses from 2250 c.p.s. to 3500 c.p.s. at 5 db to 30 db. Insert can be supplied with or without 10 meg. resistor as required.

MIC 32 insert, £2/15/6; all others, £1/19/6.

MICROPHONE INSERTS



(MIC 23 illustrated)

AMPLION (A'SIA) PTY. LTD.

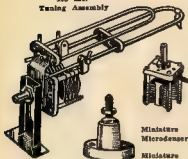
EXCLUSIVE AGENTS:

SYDNEY, AUSTRALIA

The call of
the Future...

V.H.F.

140 Mc.
Tuning Assembly



WRITE OR CALL AT—

Portable Transceivers, Remote Control and Television were made practicable by the precision manufacture of reliable miniature V.H.F. component parts.

If you're planning to build V.H.F. equipment, remember you can depend upon Gerard and Goodman who have the biggest range of stock components carrying the better known brand names.

The Biggest Range of V.H.F. Components in South Australia

EDDYSTONE
ERIE
BULGIN
BELLING-LEE
DUCON
SIMPLEX

AEGIS
L.R.C.
TRIMAX
A. & R.
ACOS
TELETRON

GOLDRING
TAYLOR
ADVANCE
UNIVERSITY
MULLARD
Q PLUS

GELOSO
U.C.C.
OXLEY
PAINTON
Q MAX
AMPHENOL

GERARD & GOODMAN LTD.

192-196 RUNDLE STREET, ADELAIDE

Phone: W 1541

ELECTRONIC
A & R
EQUIPMENT

AUDIO TRANSFORMERS!

featuring ULTRA-LINEAR!

★ TYPE 921 (921-8: 2 or 8 ohms; 921-15: 3.7 or 15 ohms)

For VALVES:

807, KT66,
etc.

Suitable Conversions

"WILLIAMSON" to U.L.

See "Audio Engineering" of June,

30 WATTS: 30-30,000 c.p.s.

Primary: 4,000 ohms.

SCREEN TAPS: 15% of Plate Z.

F.R.: Five or more 1 db 10-20,000 c.p.s.

Leakage Inductance:

14P/14P: 18 mH. maximum.

Prim./Sec.: 30 mH. maximum.

★ TYPE 931 (931-8: 2 or 8 ohms; 931-15: 3.7 or 15 ohms)

For VALVES:

6X4, EL87,
KT66, etc.

See "Radio and Hobbies" of February, 1955, 17 watts U.L. Amplifier.

30 WATTS: 30-30,000 c.p.s.

Primary: 4,000 ohms.

SCREEN TAPS: 15% of Plate Z.

F.R.: Five or more 1 db 10-20,000 c.p.s.

Leakage Inductance:

14P/14P: 18 mH. maximum.

Prim./Sec.: 18 mH. maximum.

Manufactured by . . .

A & R ELECTRONIC EQUIPMENT CO. PTY. LTD.

378 ST. KILDA ROAD, MELBOURNE, VIC.

Details from these EXCLUSIVE A & R DISTRIBUTORS!

MELBOURNE & VIC.:

J. H. Magrath & Co.
Ftr. Ltd.

Homecrafts Pty. Ltd.

Motor Spares Ltd.

Radio Parts Pty. Ltd.

Warburton Frankl Ltd.

SYDNEY — N.S.W.:

United Radio Distribu-
tors P/L 175 Philip St.

Homecrafts Pty. Ltd.

100 Clarence Street

SOUTH AUST.:

Gerard & Goodman Ltd.

195 Rundle St., Adelaide

QUEENSLAND:

A. E. Harold,
125 Charlotte St., Bris.

TASMANIA:

Homecrafts Pty. Ltd.

250 Elizabeth St., Hobart

WEST AUST.:

A. J. Wyle Pty. Ltd.,
1011 Hay St., Perth

★ Ultra Linear—Output Type

Full power and response all imped.

Type 916—12 watts.

Pr.: 5,500 ohms p.p. (with screen taps)

Sec.: 916-8: 2 or 8 ohms; 916-15: 3.7

or 15 ohms.

ALL IN
NEW COLOUR



LOOK FOR THE SILVER-GREY TRANSFORMER

Homecrafts

AMATEURS' BARGAIN CENTRE ★

B.J. PICK-UP ARM

Fits Decca Heads

83/4 plus Tax

ADAPTOR FOR ABOVE

to suit GP19 Heads

14/- plus Tax

TEST EQUIPMENT

UNIVERSITY MVA-2

MULTIMETER

£16/16/- plus Tax

PATON M32

MULTIMETER

£16/16/- plus Tax

PATON TV-M

VACUUM TUBE MULTIMETER

42 Ranges

£46/17/6 plus Tax

TAYLOR 45C

VALVE TESTER

Mutual Conductance type

£49/3/6 plus Tax

ALL

TEST EQUIPMENT

available on

HIRE PURCHASE

Homecrafts for all High Quality Audio Equipment:

WILLIAMSON AND LEAK AMPLIFIERS
WHARFDALE AND BAKER SPEAKERS
THORENS MOTORS AND PLAYERS

Vented Enclosures — Speaker Divider Networks

Write for Quotations on anything connected with Hi Fidelity Sound

CRYSTAL DIODE PROBE

for V.H.F. measurements up to 250 Mc.

£3/15/- plus Tax

ADVANCE TYPE Q1

OSCILLATOR

H.F. Range 7.5 to 100 Mc.

£74/12/- plus Tax

HIGH TENSION D.C. PROBE

To measure up to 30kv.

£9/10/- plus Tax

ADVANCE TYPE P1

OSCILLATOR

100 Kc. to 100 Mc.

£33/5/- plus Tax

| | |
|---|----------|
| 200 ohm Heavy Duty Rheostats | 9/11 |
| 5 Ma. Rectifiers | 15/- |
| Bib Wire Strippers | 5/- |
| Enamel Wire, Gauge: 18, 20, 22, 24, 26 s.w.g. 4 oz. Reels | 3/6 |
| 25 watt Output Transformers, 6,600 ohms to line | 59/6 |
| 1,200 Ft. Reels Paper Tape | 35/- |
| Headphone Windings, 500 ohms | Pair 3/- |
| Micro Switches, ball type or plunger type | 5/9 |

290 LONSDALE STREET, MELBOURNE

FB 3711

EDDYSTONE

RECOMMENDATIONS TO THE AMATEUR

MODEL "840A" COMMUNICATIONS RECEIVER

This Eddystone "840A" Communications Receiver is a successor to the famous "740" and the "840" series by virtue of the up-to-date modifications employed therein. These include the popular "750" and "680X" type of wide span dial with vernier scale. The tuning mechanism is gear driven and fly-wheel loaded giving a silky yet wholly positive control. Total effective scale length is 34 feet per range. The "840A" operates equally well from a.c. or d.c. mains, a selector switch being provided for 100/115 and 200/250 volts.

SPECIFICATIONS:

Tuning range, 480 Kc. to 30.6 Mc. in four ranges. Tube line-up: UAF42 r.f. amp., UCH42 frequency changer, UAF42 i.f. amp. and a.g.c., UAF42 a.f. amp. and detector, UL41 output, UAF42 b.f.o., UY41 rectifier, Internal loudspeaker fitted. Sensitivity better than 10 microvolts for a 15 db. signal-to-noise ratio. Selectivity 30 db. down 10 Kc. off resonance. Amateur Net Price, includ. Sales Tax



CAT. 840A

£113-0-0

F.O.B. Melbourne



CAT. 678



CAT. 696/1

EDDYSTONE ABSORPTION WAVEMETER CAT. 696/1

A most useful piece of test equipment for the Amateur. This Wavemeter employs a germanium diode rectifier and a 200 micro-amp. meter, thus making it extremely sensitive and accurate. The frequency range covered with nine coils is 200 Kc. to 220 Mc. Individual hand calibrated charts are provided and two coil stands are included to take coils not in use. This instrument and the Modulation Indicator described below are in wide use in Government communications in this country and overseas.

£27-8-4

EDDYSTONE MODULATION LEVEL INDICATOR CAT. 678

This instrument is designed to measure depth of modulation in Amateur transmitters, although it has many other uses where a portable field strength meter is required. Coils are provided to cover Amateur Bands to 28 Mc. The scale is calibrated directly in percentage modulation up to 100% and headphones may be inserted in the instrument for monitoring transmissions. As two germanium diodes are used for rectification purposes, no batteries are needed. Finished in an attractive die-cast case and complete with pick-up aerial

£23-13-11

EDDYSTONE SEMI-AUTOMATIC MORSE KEY CAT. 689

The key, of really modern design, is totally enclosed in a streamlined die-cast housing, which is finished in a fine ripple black with chrome relief. The movement is an example of first class light engineering; it is fully adjustable to enable operator to make full use of range of speeds provided. The handle is designed for right or left handed operation.

£10-3-3

All Eddystone receivers and components are available throughout Australia from selected distributors. If you are unable to locate your local source of supply, please write to us and we shall supply you with this information.



CAT. 689

AUSTRALIAN
FACTORY

REPRESENTATIVES:

R. H. CUNNINGHAM PTY. LTD.

118 WATTLETREE ROAD, ARMADALE, S.E.3, VIC.
and 184 VICTORIA ROAD, DRUMMOYNE, N.S.W.